United States Department of Agriculture | Forest Service | National Forests in North Carolina
Pisgah National Forest
Grandfather Ranger District | 109 E Lawing Dr
Nebo, NC 28761-9827
828-652-2144

File Code: 1950-1
Date: February 4, 2005

Dear Interested Members of the Public and Forest Users:

Enclosed is a copy of the Environmental Assessment (EA) for the Upper Creek Project on the Grandfather Ranger District, Pisgah National Forest. The project is located in Burke and Caldwell Counties in the Upper Creek and Lower Wilson Creek Analysis Areas. Three alternatives have been developed and analyzed in detail; Alternative A – No Action, Alternative B – Proposed Action, and Alternative C. A decision will be made that selects one of these alternatives or a modification of one. While Alternative C has been identified as the Preferred Alternative, a final decision has not yet been made. I am seeking your input on this EA before I reach a decision.

Your comments need to be as specific as possible and you must provide the following information: 1) Your name and address; 2) Title of the Proposed Action; 3) Specific substantive comments (215.2) on the proposed action, along with supporting reasons that the Responsible Official should consider in reaching a decision; and 4) Your signature or other means of identification verification. For organizations, a signature or other means of identification verification must be provided for the individual authorized to represent your organization.

In accordance with 36 CFR 215.6(2)(4), comments must be postmarked or received within 30 days beginning the day after publication of this notice in *The McDowell News*. Oral or hand-delivered comments must be received within our normal business hours of 8:00 a.m. to 4:30 p.m. Comments may be mailed electronically, in a common digital format, to: comments-southern-north-carolina-pisgah-grandfather@fs.fed.us; regular mail to: Grandfather Ranger District, Attn: District Ranger, 109 East Lawing Drive, Nebo, NC 28761; or faxed to 828-652-9511.

Please contact Michael Hutchins, Interdisciplinary Team Leader at 828-682-6146, or Greg Van Orsow, Project Leader at 828-652-2144 if you have questions concerning this proposal. Thank you for your continued interest in management of the National Forests in North Carolina.

Sincerely,

/s/ *Miera B. Crawford*

MIERA B. CRAWFORD
District Ranger

Enclosure

United States
Department
of
Agriculture

Forest
Service

February
2005

Environmental Assessment

Upper Creek Project

Grandfather Ranger District, Pisgah National Forest
Burke and Caldwell Counties, North Carolina

Upper Creek Project
Environmental Assessment

Location of Action:	Grandfather Ranger District Pisgah National Forest Burke and Caldwell Counties, North Carolina
Lead Agency:	USDA Forest Service
Responsible Official:	Miera B. Crawford District Ranger 109 East Lawing Drive Nebo, NC 28761
For More Information:	Greg Van Orsow Project Leader (828) 652-2144 (828) 652-9511 (fax) Michael Hutchins ID Team Leader (828) 682-6146 (828) 682-9179 (fax)
Send Electronic Comments to:	comments-southern-north-carolina-pisgah-grandfather@fs.fed.us

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SUMMARY

The Pisgah National Forest proposes with Alternative B to harvest about 385 acres using the two-age silviculture prescription (regeneration); designate about 296 acres of small patch old growth; construct ¼ mile of new temporary road and use an existing temporary road; use and maintain the existing road system in the project area; site prepare and subsequent release, if needed, in all stands being regenerated using herbicides and manual methods; prescribe burn approximately 350 acres; use herbicides to control a total of about one acre or less of invasive exotic (non-native) plants along the six roads; plant individuals or groups of persimmons and/or native crabapple trees in log landings; create one vernal pond off the Little Chestnut Mountain Road; and anchor large woody debris into about one mile of streambank along Timbered Branch Creek. The analysis areas total about 23,500 acres and are in the Upper Creek, Parks Creek, and Wilson Creek administrative watersheds. They are about 15 miles north of Morganton, NC, and within Compartments 87, 89, 90, 92, 93, 94, 95 and 107.

This action is needed because: age-class distribution in stands within the project area is not balanced; previously harvested stands are being out-competed by vegetation; non-native exotic vegetation is established in the analysis area and may become further established after project implementation; wildlife habitat is not as vigorous and developed as desired; and streams may be impacting water quality downstream due to sediment delivery. None of the proposed activities (except old growth designations) are within the Wilson Creek Wild and Scenic River corridor which is east of the Upper Creek project area or within the Harper's Creek Wilderness Study area, which slightly overlaps with the analysis area boundary.

In addition to the proposed action (Alternative B), the Forest Service also evaluated the following alternatives:

- *Alternative A – No Action Alternative*
- *Alternative C – Similar to Alternative B except: clearcut harvests one stand, daylights along Forest Service Road 4099, expands an existing wildlife field, and designates an estimated 475 acres of medium patch old growth*

Based upon the effects of the alternatives, the responsible official will decide to select the no-action alternative, an action alternative, or a modification of an action alternative.

CHAPTER 1 – PURPOSE AND NEED

1.1 Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

- *Chapter 1 – Purpose and Need:* This section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Chapter 2 – Alternatives:* This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on key issues raised by the public and other agencies. This discussion also includes possible mitigation measures. This section also provides a summary of the environmental consequences associated with each alternative.
- *Chapter 3 – Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by key issues. Within each section, the affected environment is described first, followed by the effects of the No-action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- *Chapter 4 – Preparers and Public Involvement:* This section provides a list of preparers and members of the public consulted during the development of the environmental assessment.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

1.1.1 Project Record

This Environmental Assessment (EA) incorporates by reference the project record (40 CFR 1502.21). The project record contains specialist reports and other technical documentation used to support the analysis and conclusions in this EA. The specialist reports provide additional detailed analysis. This EA incorporates by reference the Nantahala and Pisgah Management Indicator Species (MIS) Report. This report along with Monitoring and Evaluation Reports for the National Forests in North Carolina determine the forest population trends for MIS species.

Relying on specialist reports and the project record helps implement the CEQ Regulations' provision that agencies should reduce NEPA paperwork (40 CFR 1500.4), and that NEPA documents be analytic rather than encyclopedic and kept concise and no longer than absolutely necessary (40 CFR 1502.2). The objective is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated, without repeating detailed analysis and background information available elsewhere. The project record is located at the Grandfather Ranger District Office in Nebo, NC.

1.2 Background

This environmental assessment (EA) documents the results of site-specific analyses concerning proposed activities of the Upper Creek Project on the Grandfather Ranger District, Pisgah National Forest.

The ~23,500 acres for analysis is in the Upper Creek and Lower Wilson Creek Analysis Areas (AA) and within the Upper Creek, Parks Creek, and Wilson Creek administrative watersheds about 20 miles north-northeast of the Grandfather Ranger Station, within Compartments 87, 89, 90, 92, 93, 94, 95 and 107 in Burke and Caldwell Counties (see Vicinity Map at the end of the Chapter). The proposed activities are within Management Areas (MA) 1B, 2A, 3B, and 18 as designated in the Land and Resource Management Plan, Amendment 5, for the Nantahala and Pisgah National Forests North Carolina (1994) (hereafter called the Forest Plan). Management Area 1B, encompassing 12 percent of the Upper Creek AA and 6 percent of the Lower Wilson Creek AA is managed to "*Emphasize sustained-yield timber management. Emphasize motorized recreation use. Permit road construction. Base method of harvest on site specific analysis. Manage habitats of mixed ages or forests, primarily for deer, grouse, and animals requiring similar environments*." (Forest Plan, page III-54). Management Area 2A, encompassing 25 percent of the Upper Creek AA and 9 percent of the Lower Wilson Creek AA is managed to "*Emphasize visually pleasing scenery. Emphasize motorized recreation use. Permit timber production, but modify it to meet visual quality objectives. Permit road construction. Manage habitat of mature forests primarily for squirrel, pileated woodpecker, and animals requiring similar environments*" (Forest Plan, Page III-54). Management Area 3B, encompassing 29 percent of the Upper Creek AA and 30 percent of the Lower Wilson Creek AA is managed to "*Emphasize sustained yield timber management. Close most roads to motorized vehicles. Permit road construction. Base method of harvest on site-specific analysis. Manage habitat of mixed ages of forests primarily for turkey, and animals requiring similar environments*" (Forest Plan page, III-55). Management Area 18 lands are embedded in other management areas and encompass 6 percent of the Upper Creek AA and 4 percent of the Lower Wilson Creek AA. These lands are to be "*…actively managed to protect and enhance, where possible, the distinctive resource values and characteristics dependent on or associated with these systems. For example, timber management can only occur in this area if needed to maintain or enhance riparian habitat values*" (Forest Plan page III-179). Management areas 2C, 4C, 4D, and 6 are also within the Upper Creek and Lower Wilson Creek AAs, but activities are not proposed in them with this project.

This EA tiers to the Final Environmental Impact Statement (FEIS) for the Forest Plan and to the FEIS for Vegetation Management in the Appalachian Mountains (VMAM).

1.3 Proposed Action

The Proposed Action (Alternative B) has been developed by the Forest Service to meet the Purpose and Need of this project. A more detailed discussion on the Proposed Action is located in Chapter 2, Section 2.2.3. The Proposed Action would:

- Harvest about 385 acres using the two-age regeneration harvest prescription;
- Designate about 296 acres of small patch old growth by compartment;
- Use and maintain the existing road system;

- ◊ Site prepare and subsequently release, if needed, in all stands being regenerated using herbicides and manual methods;
- ◊ Prescribe burn approximately 350 acres within Compartment 90;
- ◊ Use herbicides to control a total of about one acre or less of invasive exotic (non-native) plants along roads;
- ◊ Plant individuals or groups of persimmons and/or native crabapple trees in log landings;
- ◊ Create one vernal pond off the Little Chestnut Mountain Road following harvest activities; and
- ◊ Anchor large woody debris into about one mile of streambank along Timbered Branch Creek.

1.3.1 Changes Between Scoping and EA

Since September 2004, when scoping for the proposal was initiated until completion of this EA, the following changes have taken place:

- ◊ Harvest acreage was reduced about 30 acres;
- ◊ Temporary roads constructed was reduced by ¼ mile;
- ◊ Control of invasive exotic plants was revised to occur along Forest Service Roads 4096, 4099, 299, 986, 1410, 982, and the Old Way Ridge Road;
- ◊ Development of the vernal pond near Chestnut Mountain Road was eliminated;
- ◊ Development of two log landings near Little Chestnut Mountain into two-acre wildlife fields was eliminated;
- ◊ Re-establishing about 200 feet of Craig Creek to its original channel was removed from this proposal because funds from the 2004 storms became available to repair this reach. The proposed project is addressed in Chapter 3 and the biological evaluation (Appendix A), but the activity would occur following a separate decision. Removing this action from this proposal would allow it to be implemented sooner and speed watershed recovery;
- ◊ Additional project design features were added to improve conditions in the project area (see Section 2.2.3, Chapter 2);
- ◊ The proposed harvest acreage for Stand 95-01 was reduced from 26 acres to 4 acres and the proposed logging system was changed from skyline to skidder to ensure the standard of 15% maximum 0-10 year age class in Compartment 95 would not be exceeded (Forest Plan, page III-30);
- ◊ The proposed designation of 473 acres of small patch old growth by compartment was reduced to 296 acres because previously identified small patches were discovered to exist within compartments 87, 92, and 94; and
- ◊ Alternative C was developed encompassing the previous bulleted items and public comments.

1.4 Purpose and Need for Action

The purpose of this proposal is to:

- ◊ Balance age-class distribution, improve timber stand conditions, and provide for a continuous supply of timber using silvicultural prescriptions that favor red oak, white oak, and hickory tree species where they occur;

- ◊ Reduce competition and improving species composition in existing and proposed harvest units through herbicide use and manual methods;
- ◊ Control non-native invasive species through herbicide use;
- ◊ Improve conditions for wildlife by creating additional early-successional habitat and enhancing existing fields;
- ◊ Reduce existing fuel levels and improve habitat and timber stand conditions through prescribed fire near Brown Mountain; and
- ◊ Enhance aquatic habitat by balancing the pool:riffle ratio along a reach of Timbered Branch Creek.

1.4.1 Why Here, Why Now?

The existing condition of the Upper Creek project area has been evaluated and compared against the desired future condition for the area as described in the Forest Plan. Where resources in the project area are found to be outside the desired future condition, opportunities for moving the resources towards the desired future condition exist. The Upper Creek project area was chosen at this time for vegetation management over other areas on the Grandfather Ranger District because of its planned order of entry in the Nantahala and Pisgah National Forests, A Schedule of Entry By Analysis Area. The last appreciable entry (approx. 100 acres in size and/or within past 10 years) in the Upper Creek AA was over 11 years ago (1994) and 115 acres, and in the Lower Wilson Creek AA was over 14 years ago (1991) and 92 acres. The Forest Plan permits re-entry into Management Area 1B and 3B stands every 10 years and MA 2A stands every 10-15 years to meet early succession habitat standards (Forest Plan, pages III-60, III-68, and III-75). Stands in the watershed currently do not meet Forest Plan standards for early successional habitat (Forest Plan, page III-29) or for small patch Old Growth (Forest Plan, page III-27). Harvesting is proposed to ensure early successional vegetation in the watershed achieves desired ranges identified in the Forest Plan. The Proposed Action was developed to move resources in the project area towards the desired future condition using active management. The following table contrasts by resource element the desired future condition for the project area and the existing condition of the project area:

Table 1-1: Comparison of Desired Future Condition with the Existing Condition

Resource Element	Desired Future Condition	Existing Condition
Vegetation (Forest Plan, pages III-29 – III-39)	a) Provide and maintain plant community diversity to meet overall multiple use goals. b) Use timber management practices to create or improve forest diversity.	a) The forested vegetation consists of common community types dominated by cove hardwoods and upland hardwoods. Age-class distributions are discussed in the "Timber" discussion below. b) There are invasive, non-native (exotic) plants located along FSRs 4096, 4099, 299, 986, 1410, 982, and FSR "old way ridge", which are <1 acre in size total.
Soil and Water (Forest Plan pages III-40 – III-42)	a) Provide measures to protect, maintain, and improve soil, water, and air resources. Provide stream management to balance development, environmental protection, and community, and recreation needs. Manage riparian areas to protect soil, water, vegetation, fish, and wildlife resources. Maintain and enhance flood plain, wetland, and riparian areas distinctive values and natural functions.	a) Soil map units in the project area are classified as moderately deep and well drained to very deep and well drained with moderate productivity. The aquatic community in the project area consists of mostly small, headwater stream reaches that support aquatic macroinvertebrates and contain no habitat for fish. Streams in the analysis area contain fish habitat. Water quality is improving. Forest Plan standards (which currently exceed North Carolina best management practices) are followed to ensure resource protection.
Fisheries and Wildlife (Forest Plan, pages III-22 – III-25)	a) Maintain viable populations of existing native and desired non-native vertebrate species in the planning area. b) Assure a regular and sustained flow of habitats across the Forest through space and time for diversity and viability of plant and animal populations. Use timber management practices as the primary tool to create desired habitat. c) Manage habitats of mixed ages of forests primarily for turkey and animals requiring similar environments (i.e. those that thrive in young to middle aged forests). d) Provide at least 0.5% (3% desired level) of MA 3B in grass/forb openings at any one time, including mowed landings and roads.	a) Due to the diversity of habitat within the analysis area, there is a large variety of wildlife within the analysis area. b) There are large blocks of connected forest lands, which provide travel corridors for a variety of species. c) See "Timber" discussion below for age-class distribution. d) There is about <1% grass/forb habitat in the analysis areas.
Old Growth (Forest Plan, pages III-26 – III-28)	a) Small Patches: Select a contiguous area at least 5% the size of the national forest land in the compartment or at least 50 acres, whichever is greater. Compartments containing part of a large or medium patch do not need an additional small patch.	a) All project area compartments are short of meeting Forest Plan standards for small patch old growth (see Appendix C for old growth analysis).

Resource Element	Desired Future Condition	Existing Condition
Endangered, Threatened, Sensitive Species (Forest Plan, pages III-22 – III-25)	a) Protect and enhance critical habitat for threatened and endangered species. Protect and enhance sensitive plants, animals, or features through appropriate management.	a) See the Biological Evaluation for current populations of threatened, endangered, and/or sensitive species within the landscape, the potential for a given species and related mitigation measures.
Timber (Forest Plan, pages III-29 – III-39, and III-75)	a) Produce a continuous supply of sawtimber and other wood products. Provide timber management practices to produce high quality sawtimber as the primary product. Use a minimum rotation age of 80 years for hardwoods and 60 years for pine in MA 3B. Provide wood products to meet public demands consistent with multiple use objectives, including desired effects on water quality, fish/wildlife habitat, tree species, recreation use, and aesthetics. b) Disperse early successional habitat across the landscape. Desired levels for; MA 1B are 5-15% of the compartment; MA 2A are 5-10% of the compartment; MA 3B are 5-15% of the compartment.	a) The last timber sale to occur in the Upper Creek AA was within Compartments 95 and 96 in 1994, which harvested 115 acres of timber, and the Lower Wilson Creek AA within Compartments 90, 91, 92 and 93 in 1991, which harvested 92 acres of timber (see Table 3-4, Chapter 3). b) See Appendix B, Age-class Analysis.

1.5 Decision Framework

Based on the analysis disclosed in this EA, the Responsible Official will make a decision and document it in a Decision Notice and Finding of No Significant Impact. The Responsible Official can:

- Select an action alternative that has been considered in detail, or
- Select a modified action alternative, or
- Select the No-action Alternative.

1.6 Public Involvement

The proposal was provided to the public and other agencies for comment during a 30-day scoping period that began on August 20, 2004, and was scheduled to close on September 20, 2004. Due to Tropical Storm Frances, Ivan, and Jeanne, the comment period was extended to October 1, 2004. On August 31, 2004, and September 20, 2004, different members of the public met with Forest Service employees to discuss the proposal. The proposal was also listed in the Schedule of Proposed Actions for winter 2005.

Using comments received from the public, agencies, and organizations during this period, as well as internal review the interdisciplinary team (IDT) developed a list of issues to address.

1.7 Issues

Issues are defined as a point of discussion, debate, or dispute about environmental effects. Issues are used to develop alternatives, mitigation measures, or analyze environmental effects. The Forest Service separated issues into two groups: key and non-key issues.

The Council on Environmental Quality (CEQ) regulations specifies that environmental analysis focus on significant (key) issues. Issues determined not to be significant (non-key) shall be discussed only briefly and eliminated from detailed study [40 CFR 1500.1(b), 1500.2(b), 1500.4(c), 1501.7(3), and 1502.2(b)]. The key issues will be analyzed in Chapter 3 of this EA and will also help form the decision. The non-key issues will be disclosed here in Chapter 1 with an analysis, but not in Chapter 3. They will not be used to form the decision.

1.7.1 Key Issues

1.7.1.1 Key Issue #1: Water Quality and Aquatic Habitat – *The proposed action may adversely affect water quality*

Indicators

- ◊ Number of new stream crossings
- ◊ Miles of temporary road constructed
- ◊ Type of watershed enhancement activities

1.7.1.2 Key Issue #2: Wildlife Habitat/Fragmentation – *The proposed action may impact wildlife habitat*

Indicators

- ◊ Acres of grass/forb openings expanded
- ◊ Acres of grass/forb landings planted
- ◊ Miles of road daylighted
- ◊ Percent of grass/forb openings
- ◊ Habitat connectivity

1.7.1.3 Key Issue #3: Age-class Distribution – *Age-class distributions within the analysis area are not balanced as desired in the Forest Plan*

Indicator

- ◊ Acres by age class before and after implementation

1.7.1.4 Key Issue #4: Old Growth Habitat – *The proposed action may affect existing and potential old growth habitat*

Indicators

- ◊ Acres treated by age class
- ◊ Acres of newly designated old growth

1.7.2 Non-Key Issues

1.7.2.1 Non-key Issue A: Restoration without Harvesting or Road Building – *The proposed action may impact water quality, fish habitat, wildlife habitat and other forest resources due to harvesting and road construction*

- ◊ Non-key because harvesting is required to meet Forest Plan standards for early successional habitat (see also Section 2.3.2, Chapter 2).

1.7.2.2 Non-key Issue B: Herbicide Use – *Herbicide use may adversely affect wildlife, water quality, and humans*

- Non-key due to proper application as per MSDSs, Product Labels, and Risk Assessments. The use of herbicides in the action alternatives may pose some risk to human health and safety, and fish or wildlife. However, any herbicides applied would be done according to the labeling information and at the lowest rate effective at meeting project objectives in accordance with guidelines for protecting the environment. When labeling and application directions are followed and safety recommendations are implemented no adverse effects are expected. The effects of the treatment would be limited to the trees and the immediate vicinity. Herbicide with the active ingredients Glyphosate and Triclopyr are not considered soil active. In addition, with the provision of riparian buffer strips on stream zones, the risk of herbicide spills or movement into stream zones is further reduced. All applicable mitigation measures contained in the Vegetation Management in the Appalachian Mountains (VMAM) FEIS, issued in July 1989, would be followed. A complete discussion of the effects of herbicides is contained in this FEIS, to which this document tiers. Current risk assessments for Glyphosate and Triclopyr may be found at: www.fs.fed.us/foresthealth/pesticide/risk.htm.

  The use of herbicides carries some risks to human health and safety, particularly to the applicator. This risk is reduced by requiring the applicator to be trained in safety precautions, proper use, and handling of herbicides. Other factors reducing the risk of herbicide use to human health and safety is the low level of active ingredient per acre and placement of notice signs posted in areas where herbicide has been applied. The signs include information on the herbicide used, when it was applied, and who to contact for additional information (see also Appendix F, Standard Mitigation Measures for Prescribed Fire and Herbicide Use).

1.7.2.3 Non-key Issue C: Cultural Resources – *Harvest related activities may adversely affect heritage sites*

- Non-key due to site-specific field verification and avoidance

Thirty-six archeological sites were located and recorded during the heritage resource survey. In addition, five prerecorded archeological sites were relocated and evaluated. Five sites are rated Class I and are eligible for inclusion in the National Register of Historic Places (NRHP) under Criteria D (36 CFR 60.4). One site (Estes/Pritchard Cemetery) is currently unevaluated, and me be eligible to the NRHP upon further evaluation. Thirty-five sites are rated Class III and are not considered eligible to the NRHP.

Alternative A

There are no expected adverse direct, indirect, or cumulative effects with this alternative.

Alternatives B & C

There are no expected adverse direct, indirect, or cumulative effects with implementation of either of these alternatives as identified heritage sites would be protected through avoidance.

1.7.2.4 Non-key Issue D: Soil Resources – *Harvest related activities may adversely affect sensitive soils*

- Non-key due to implementation of Forest Plan standards and guidelines and best management practices (BMPs) on soil mapping units identified with erosion hazard

Table 1-2: Primary Soil Map Units by Stand by Action Alternative

Stand	Primary Soil Map Unit Name[1]	Avg. Slope Percent	Alternative B (acres)	Alternative C (acres)
87-22	Evard Complex	25-60	21	21
90-03	Evard-Cowee Complex	8-50	38	38
92-05B	Evard-Cowee Complex	8-50	33	33
92-05C	Evard-Cowee Complex	8-50	26	26
93-02	Evard-Cowee Complex	25-90	12	12
94-01	Evard-Cowee Complex	25-90	16	16
94-02	Evard-Cowee Complex	15-90	15	15
95-08	Evard-Cowee Complex	8-90	12	12
95-27	Evard-Cowee Complex	8-50	9	9
95-36[2]	Evard-Cowee Complex	15-90	36	36
95-37	Evard-Cowee Complex	25-90	4	4
95-40	Evard-Cowee Complex	8-90	17	17
107-02[3]	Evard-Cowee Complex	25-50	27	27
107-11	Evard-Cowee Complex	15-90	13	13
Total Evard Complex			**279**	**279**
89-01	Chestnut-Edneyville Complex	15-50	17	17
90-05	Ashe-Chestnut Complex	25-50	7	7
92-05A	Ashe-Chestnut Complex	8-25	21	21
Total Chestnut Complex			**45**	**45**
95-01	Edneytown-Pigeonroost Complex	25-50	4	4
Total Edneytown-Pigeonroost Complex			**4**	**4**

1 – Indicates the soil map unit that is a majority of the stand—other soil map units make up the remainder of the stand
2 – Requires ¼ mile of temporary road construction for access
3 – Clearcut harvest prescription under Alternative C and two-age harvest prescription under Alternative B

The following table displays characteristics of each soil map unit:

Table 1-3: Comparison of Soil Map Units

Map Unit Name	Characteristics
Evard-Cowee	Evard soils are very deep and well drained; Cowee soils are moderately deep and well drained over soft bedrock. Map unit has moderate productivity, and moderate risk (erodibility) and sensitivity.
Chestnut-Ashe-Edneyville	Ashe soils are somewhat excessively drained and moderately deep over hard bedrock. Chestnut soils are moderately deep to soft bedrock. Edneytown soils are very deep and well drained. Map unit has low productivity, and high risk (erodibility) and sensitivity.
Edneytown-Pigeonroost	Edneytown soils are very deep and well drained; Pigeonroost soils are moderately deep and well drained over soft bedrock. Map unit has moderate productivity, and moderate risk (erodibility) and sensitivity.

Alternative A

There would be no adverse effects to soils with this alternative. Any areas with current erosion would not be corrected. Soil displacement and compaction related to temporary road construction and landing construction would not occur.

Alternatives B & C

There are no anticipated adverse effects to soils with either of these alternatives because the soil types in the project area are all at least moderately deep and well drained (reducing potential for compaction); would not be taken out of production with classified (permanent) road

construction; and would have mitigation measures (Section 2.4, Chapter 2) and Forest Plan standards (BMPs) applied to further reduce potential for compaction and long-term damage. There would be some minor, short-term erosion with the construction of ¼ mile of temporary road in both alternatives. However, the effects are not expected to be major since they would be limited in their extent when applied to the total area of operation and short-term. Both alternatives propose 77 acres of harvest with cable logging systems (partial suspension of logs) and 308 acres of harvest with ground based logging equipment (skidders or caterpillars). Cable logging systems afford higher protection to soils than ground based systems, but adverse effects to soils are not expected to occur for the reasons stated above.

1.7.2.5 Non-key Issue E: Botanical Resources – *Harvest related activities may affect botanical resources*

- ◊ Non-key due to site-specific field verification. The two action alternatives may adversely affect individual plants, but neither would adversely affect population viability (Botanical Report, Project Record). The following table summarizes effects to threatened, endangered, sensitive, and Forest Concern botanical species (see also the Biological Evaluation, Appendix A and the Botanical Report, Project Record for additional analysis):

Table 1-4 – Summary of Effects to Plant T&E, S, and FC Species by Alternative

	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C
Sensitive species *Tsuga caroliniana*	No direct or indirect effect to T&E, S, and FC plant species	May effect directly or indirectly affect individuals; no adverse effects to population viability	May effect directly or indirectly affect individuals; no adverse effects to population viability
All other Forest Concern, Sensitive, or Federal plant species	No direct or indirect effect	No direct or indirect effect	No direct or indirect effect

1.7.2.6 Non-key Issue F: Scenery & Recreation Resources – *Harvest related activities may adversely affect scenic and recreation resources*

- ◊ Non-key due to site-specific field verification and design of stands near scenic and recreation areas of concern (see also Scenery/Recreation Report, Project Record)

Alternative A Direct & Indirect Effects to Scenery or Recreation

Under this alternative, all Forest Plan standards for scenery and recreation resource management would be met.

Alternative B & C Direct & Indirect Effects to Recreation

As a result of implementation of either Alternatives B or C, hunting opportunities would be improved. Motorists, horseback riders, or mountain bikers may encounter logging trucks or activities when riding Forest Service system roads and views of additional timber harvest areas may be seen by recreation users along these roads. This would be true for Brown Mt. Off Highway Vehicle (OHV) trail riders as well. Hikers, campers, swimmers, fishermen, picnickers or W&S River users may hear the distant sounds of logging activities. All potential impacts to recreation would be of a temporary nature, therefore no recreation opportunities would be permanently altered or diminished.

Alternative B Direct & Indirect Effects to Scenery

This alternative proposes 385 acres of two-age harvest, 350 acre of prescribed burn, and ¼ mile of temporary haul road construction. The following table summarizes this alternative:

Table 1-5 – Summary of Alternative B Effects to Scenery

Stand	Ac	MA	Method	Temp Rd Constr.	View Point#	VQO	Mitigation
87-22	30	3B	Two-Age		N/A	M	N/A
93-02	12	3B	Two-Age		11	M	N/A
94-01	16	3B	Two-Age		11	M	N/A
94-02	15	3B	Two-Age		11	M	N/A
95-01	4	3B	Two-Age		1, 4, 8	M	N/A
95-27	9	3B	Two-Age		4	M	N/A
95-36	36	3B	Two-Age	0.25 mile	4, 13	M	N/A
95-37	4	3B	Two-Age		4, 13	M	N/A
107-02	40	3B	Two-Age		1	M	N/A
107-11	13	3B	Two-Age		N/A	M	N/A
95-08	15	2A	Two-Age		4, 7	PR	A
95-40	18	2A	Two-Age		4, 7	PR	A
89-01	29	1B	Two-Age		N/A	M	N/A
90-03	39	1B	Two-Age		5, 12	M	B
90-05	17	1B	Two-Age		5, 12	M	N/A
92-05 A	21	1B	Two-Age		6	M	B
92-05 B	40	1B	Two-Age		6, 9	M	B
92-05 C	27	1B	Two-Age		6	M	N/A
90	350	2A	Burn		9	PR	N/A

A Move upper unit boundary of stands 95-08 and 95-40 one tree-height below ridge. Maintain 25-30 basal area/acre to screen and blend-in harvest activities as seen from trail 273

B Harvest openings along open system roads in stands 90-03, 92-05A, and 92-05B should not exceed 500 linear feet

1 Viewpoints: (1) NC 181, (2) SR 1328, (3) SR 1405, (4) FSR 982, (5) FSR 299, (6) FR 4101, (7) TR 273, (8) Brown Mountain Overlook, (9) Brown Mountain OHV Area trails, (10) Wilson Creek, (11) Upper Creek, (12) Carroll Creek, (13) Timbered Branch, and (14) Brown Mt. Beach

Alternative C Direct & Indirect Effects to Scenery

This alternative proposes 345 acres of two-age harvest, 40 acres of clearcut harvest, 350 acres of prescribed burning, ¼ mile of temporary road construction, and day-lighting Forest Service Road (FSR 299). The following table summarizes this alternative:

Table 1-6 – Summary of Alternative C Effects to Scenery

Stand	Ac	MA	Method	Temp Rd Constr.	VP#	VQO	Mitigation
87-22	30	3B	Two-Age		N/A	M	N/A
93-02	12	3B	Two-Age		11	M	N/A
94-01	16	3B	Two-Age		11	M	N/A
94-02	15	3B	Two-Age		11	M	N/A
95-01	4	3B	Two-Age		1, 4, 8	M	N/A
95-27	9	3B	Two-Age		4	M	N/A
95-36	36	3B	Two-Age	0.25 mile	4, 13	M	N/A
95-37	4	3B	Two-Age		4, 13	M	N/A
107-02	40	3B	Clearcut		1	M	N/A
107-11	13	3B	Two-Age		N/A	M	N/A
95-08	15	2A	Two-Age		4, 7	PR	A
95-40	18	2A	Two-Age		4, 7	PR	A

Stand	Ac	MA	Method	Temp Rd Constr.	VP#	VQO	Mitigation
89-01	29	1B	Two-Age		N/A	M	N/A
90-03	39	1B	Two-Age		5, 12	M	B
90-05	17	1B	Two-Age		5, 12	M	N/A
92-05 A	21	1B	Two-Age		6	M	B
92-05 B	40	1B	Two-Age		6, 9	M	B
92-05 C	27	1B	Two-Age		6	M	N/A
90	350	2A	Burn		9	PR	N/A
90-FSR 299	N/A	2A, 1B	Day-Light		5, 9	PR, M	N/A

A Move upper unit boundary of stands 95-08 and 95-40 one tree-height below ridge. Maintain 25-30 basal area/acre to screen and blend-in harvest activities as seen from trail 273

B Harvest openings along open system roads in stands 90-03, 92-05A, and 92-05B should not exceed 500 linear feet

Cumulative Effects

As previously stated, past timber harvest areas and existing roads are visible on National Forest System (NFS) lands from analyzed viewpoints. From some VPs, existing harvest areas would not be noticeable to the average viewer. Existing roads and landings may remain visible for many years, but are primarily seen during leaf-off season. A 100 acre harvest is proposed for the private tract east of stand 95-8 and would be visible from the eastern terminus of trail 273 and a closed (gated) section of FSR 299. This private tract would not be visible in conjunction with any proposed Upper Creek treatments from any analyzed viewpoints; therefore cumulative scenery impacts would not be an issue. Treatments proposed for some Upper Creek units would create visible openings, or the canopy may appear thinner as seen from analyzed viewpoints. However, all assigned VQOs would be met, even where these proposed treatments would be seen in conjunction with existing management activities.

1.7.2.7 Non-key Issue G: Non-timber Related Economics – *Harvest related activities may have adverse effects to non-timber related markets*

- This issue is non-key because it is beyond the scope of this project to place a quantifiable number on values such as aesthetics, habitats, and recreation opportunities. This project is small in scale and it would be difficult to assign quantifiable numbers to those values without introducing personal judgments into the analysis. Any two analysts would arrive at different results. Forest Service policy requires a financial efficiency analysis be prepared for timber sale proposals expected to exceed $100,000 in value (Forest Service Manual 2432.12)—a financial efficiency analysis was completed for the action alternatives and is disclosed in Appendix E. An economic impact analysis of resource values is not required if environmental effects are minimal. A discussion of non-market valuation is described in the EIS to the Forest Plan to which this document tiers.

1.7.2.8 Non-key Issue H: Air Quality – *Prescribed fire may decrease air quality in the watershed*

- This issue is non-key because prescribed burning on National Forest System (NFS) lands is done under specific weather conditions designed to minimize the effect on air quality. Effects from the prescribed burn proposed in the action alternatives would be temporary in nature (1 to 2 years). The current effect from all sources now contributing to air quality is minor.

1.7.2.9 Non-key Issue I: Other Areas of Concern – *Harvest activities may adversely affect park lands, prime farmlands, wetlands, wild and scenic rivers, ecologically critical areas, or local law or requirements imposed for the protection of the environment.*

- ◊ The Upper Creek Project does not propose actions within park lands, prime farmlands, wetlands (as per 1977 Executive Orders 11988 and 11990), wild and scenic rivers, or ecologically critical areas. It also would not violate local law or requirements imposed for the protection of the environment.

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CHAPTER 2 – ALTERNATIVES

Chapter 2 is the "heart" of this EA (40 CFR 1502.14) and describes alternatives the agency considered in addition to the proposed action. This chapter also compares each alternative.

2.1 Range of Alternatives

The range of alternatives developed and analyzed by the interdisciplinary team (IDT) was driven by the purpose and need underlying the proposal (Section 1.4, Chapter 1), and by the key issues responding to the proposal. An alternative should (1) reasonably respond to the purpose and need, and (2) address one or more key issues. The only exception is the No Action Alternative, which is required by regulation [40 CFR 1502.14(d)].

The interdisciplinary team (IDT) considered five alternatives. Following internal review, three alternatives were developed in detail and two were eliminated from detailed study.

2.2 Alternatives Considered in Detail

Three alternatives were developed by the IDT in response to the issues and concerns regarding the proposal; Alternative A – No Action, Alternative B – Proposed Action, and Alternative C. The action alternatives fulfill the specific purpose and need for these actions. Mitigation measures for activities in each action alternative are also described in this chapter.

2.2.1 Summary of Alternatives

The following table summarizes management activities within each of the alternatives (see also Section 2.5 below):

Table 2-1: Management Activities for Action Alternatives

Activity	Alternative[1]		
	A	B	C
Regeneration Harvest	0	385	385
Slash/Stump Spray Site Preparation	0	308	308
Pre-harvest Streamline/inject Site Preparation	0	77	77
Streamline Release (TSI) if needed	0	385	385
Prescribed Fire	0	350	350
Plant Yellow Pine	0	0	40
Plant Persimmon/Crabapple in Log Landings and a Wildlife Field	0	45	45
Treat Invasive Plant Species Along Six Forest Service Roads	0	1	1
Designate Small Patch Old Growth	0	296	296
Designate Medium Patch Old Growth	0	0	475 (est.)
New Temporary Road Construction (miles)	0	0.25	0.25
Create Vernal Ponds (number)	0	1	1
Anchor Large Woody Debris Along Timbered Branch Creek (miles)	0	1	1
Expand An Existing Wildlife Field	0	0	1
Daylight Along Forest Service Road 4099	0	0	6.5

1 Measurements are in acres unless otherwise specified

2.2.2 Alternative A – No Action

Under this alternative, the projects described in the proposed action (Section 1.3, Chapter 1) would not be accomplished. No management actions would take place at this time to improve the existing condition of the environment in the project area. There would be no regeneration, thinning or timber stand improvements, treatment of non-native invasive species, designation of small or medium patches for old growth restoration, nor wildlife or aquatic habitat improvements made. This alternative serves as the environmental baseline for analysis of effects.

2.2.3 Alternative B – Proposed Action

This alternative was developed to improve existing stand conditions while providing a continuous supply of sawtimber; improve distribution and percent of early successional habitat; identify old growth; reduce invasive exotic plant species; reduce fuel accumulations; and improve wildlife habitat and aquatic-related resources. Specific activities and locations are displayed in the following table and in the Alternative B map located at the end of this Chapter.

Table 2-2: Stands Proposed for Treatment – Alternative B

Compartment -Stand	Est. Acres	Management Type[1]	Age	Harvest Method	Method Of Logging	Site Preparation	TSI (if needed)
87-22	30	Upland Hwd	84	Two-Age	Skidder	Slash/SS[2]	Streamline
89-01	29	Upland Hwd	89	Two-Age	Skidder	Slash/SS	Streamline
90-03	39	Upland Hwd	92	Two-Age	Skidder	Slash/SS	Streamline
90-05[3]	17	Upland Hwd	86	Two-Age	Skidder	Slash/SS	Streamline
92-05A	21	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
92-05B	40	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
92-05C	27	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
93-02	12	Upland Hwd	89	Two-Age	Skidder	Slash/SS	Streamline
94-01	16	Upland Hwd	99	Two-Age	Skidder	Slash/SS	Streamline
94-02	15	Upland Hwd	99	Two-Age	Skidder	Slash/SS	Streamline
95-01	4	Upland Hwd	89	Two-Age	Cable	Strm/Inject[4]	Streamline
95-08	15	Upland Hwd	74	Two-Age	Cable	Strm/Inject	Streamline
95-27	9	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
95-36[5]	36	Upland Hwd	94	Two-Age	Cable	Strm/Inject	Streamline
95-37	4	Upland Hwd	94	Two-Age	Cable	Strm/Inject	Streamline
95-40	18	Upland Hwd	79	Two-Age	Cable	Strm/Inject	Streamline
107-02[6]	40	Upland Hwd	92	Two-Age	Skidder	Slash/SS	Streamline
107-11	13	Upland Hwd	95	Two-Age	Skidder	Slash/SS	Streamline
Total Acres	**385**						

1 Following harvest activities in the two-age treatment areas, the management type (Forest Plan, page III-75) of each stand would be maintained. Species composition may be different; however, stand conversion from one management type to another would not occur.

2 Site preparation referred to as Slash/SS includes post-harvest cutting of residual trees 2 to 10 inches in diameter and treating the stumps of the "undesirable" species with herbicide to prevent sprouting. This includes but is not limited to species such as maple, dogwood, and black gum. The objective is to promote sprouting of desirable species, particularly the oaks, but control competing vegetation by treating the stumps to prevent them from sprouting back at the same time.

3 Requires use of an existing temporary road and a bridge.

4 Site Preparation referred to as Strm/Inject includes "streamline" application of herbicide on undesirable stems 1 to 2.9 inches in diameter and using tree injection or "hack and squirt" cut surface treatment to apply a small amount of diluted herbicide to the stems of individual competing trees 3 to 8 inches in diameter.
5 Requires ¼ mile of temporary road construction for access.
6 Requires an existing temporary road be used for access.

Regeneration of new forest stands would be accomplished by site preparation and reforestation methods as outlined below:

- On three cable logging units (95-01, 95-08, 95-40, 95-36 and 95-37) totaling approximately 77 acres, prior to harvest operations, undesirable tree species less than merchantable size would be treated with an herbicide with the active ingredients Glyphosate or Triclopyr to control competition from those species (for all herbicide applications in all alternatives, Glyphosate would be applied at rates outlined on the label and Triclopyr would be applied at up to 4 pounds of active ingredient per acre as outlined in the revised application rates for the VMAM which is also included in Appendix G of this document);
- Following logging operations, a regeneration survey would be conducted to determine whether an area had sufficient natural regeneration from seed, seedlings, or sprouts. If not, seedlings would be planted at a rate per acre that would supplement natural regeneration to create fully stocked stands. After 3 to 4 growing seasons, streamline release using an herbicide with the active ingredient Triclopyr would be used, if needed, to maintain adequate stocking of desirable tree species. These areas would be managed for forest types similar to those occurring before harvest;
- In all stands (except 95-01, 95-08, 95-40, 95-36 and 95-37) following logging operations, competing tree species between 2-inch diameter breast height (dbh) and 10-inch dbh that were not knocked down or cut during logging would be treated with an herbicide containing the active ingredient Glyphosate or Triclopyr to control competition from those species. Merchantable tree species not cut during logging, excluding reserved trees and undamaged residual northern red oak, white oak, chestnut oak, hickory, ash and yellow-poplar 6-inch dbh or larger, would be cut with chainsaws. A regeneration survey would be conducted to determine whether an area had sufficient natural regeneration from seed, seedlings, or sprouts. If not, seedlings would be planted at a rate per acre that would supplement natural regeneration to create fully stocked stands. After 3 to 4 growing seasons, streamline release using herbicides would be used, if needed, to maintain adequate stocking of desirable tree species.

In addition to regeneration of new forest stands, the following activities would occur:

- Use and maintain the existing road system;
- Designate 296 acres of small patch old growth by compartment;
- Site preparing and subsequent release, if needed, in all stands being regenerated using herbicides and manual methods;
- Prescribe burn approximately 350 acres within Compartment 90;
- Plant individuals or groups of persimmons and/or native crabapple trees in log landings;
- Following harvest activities, create one vernal pond off the Little Chestnut Mountain Road;
- Anchor large woody debris into about one mile of streambank along Timbered Branch Creek to enhance aquatic habitat by balancing the pool:riffle ratio;
- Use Glyphosate herbicide to control a total of about one acre or less of the following invasive exotic (non-native) plants along the following roads prior to disturbance activities:

Table 2-3: Location of Invasive Exotic Plants Control – Alternative B

Forest Service Road	Japanese plume grass (***Miscanthus sinensis***)	Tree-of-heaven (***Ailanthus altissima***)	Princess tree (***Paulownia tomentosa***)
4096	X	X	
4099		X	X
299		X	X
986	X	X	X
Old Way Ridge	X	X	X
4101	X	X	X
982	X		

- Native plants would be utilized in wildlife habitat improvement and roadside erosion control;
- Hemlock four inches to eight inches in diameter not affected by the hemlock wooly adelgid within stands 93-02, 94-02, and 94-01, would be retained during harvest and stand improvement activities to maintain winter roost habitat for many bird species, including ruffed grouse;
- During timber stand improvement, soft mast species of holly, black gum, and dogwood would be maintained to ensure continued production of food utilized by numerous bird species and mammals; and
- Species priority for residual tree designation would be; white oak, red oak, and hickory, where present within harvest stands.

2.2.4 Alternative C

Alternative C was developed to address public concerns with old growth habitat in the analysis areas, to develop additional wildlife habitat, and to better address the reforestation of a poorly stocked insect infested stand, all while addressing the similar resource concerns as Alternative B. Specific activities and locations are displayed in the following table and in the Alternative C map located at the end of this Chapter.

Table 2-4: Stands Proposed for Treatment – Alternative C

Compartment -Stand	Est. Acres	Management Type[1]	Age	Harvest Method	Method Of Logging	Site Preparation	TSI (if needed)
87-22	30	Upland Hwd	84	Two-Age	Skidder	Slash/SS[2]	Streamline
89-01	29	Upland Hwd	89	Two-Age	Skidder	Slash/SS	Streamline
90-03	39	Upland Hwd	92	Two-Age	Skidder	Slash/SS	Streamline
90-05[3]	17	Upland Hwd	86	Two-Age	Skidder	Slash/SS	Streamline
92-05A	21	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
92-05B	40	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
92-05C	27	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
93-02	12	Upland Hwd	89	Two-Age	Skidder	Slash/SS	Streamline
94-01	16	Upland Hwd	99	Two-Age	Skidder	Slash/SS	Streamline
94-02	15	Upland Hwd	99	Two-Age	Skidder	Slash/SS	Streamline
95-01	4	Upland Hwd	89	Two-Age	Cable	Strm/Inject[4]	Streamline
95-08	15	Upland Hwd	74	Two-Age	Cable	Strm/Inject	Streamline
95-27	9	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
95-36[5]	36	Upland Hwd	94	Two-Age	Cable	Strm/Inject	Streamline

Compartment -Stand	Est. Acres	Management Type[1]	Age	Harvest Method	Method Of Logging	Site Preparation	TSI (if needed)
95-37	4	Upland Hwd	94	Two-Age	Cable	Strm/Inject	Streamline
95-40	18	Upland Hwd	79	Two-Age	Cable	Strm/Inject	Streamline
107-02[6]	40	Upland Hwd	92	Clearcut w/ reserve trees	Skidder	Slash/SS	Streamline
107-11	13	Upland Hwd	95	Two-Age	Skidder	Slash/SS	Streamline
Total Acres	**385**						

1 Following harvest activities in the two-age treatment areas, the management type (Forest Plan, page III-75) of each stand would be maintained. Species composition may be different; however, stand conversion from one management type to another would not occur.
2 Site preparation referred to as Slash/SS includes post-harvest cutting of residual trees 2 to 10 inches in diameter and treating the stumps of the "undesirable" species with herbicide to prevent sprouting. This includes but is not limited to species such as maple, dogwood, and black gum. The objective is to promote sprouting of desirable species, particularly the oaks, but control competing vegetation by treating the stumps to prevent them from sprouting back at the same time.
3 Requires use of an existing temporary road and a bridge for access.
4 Site Preparation referred to as Strm/Inject includes "streamline" application of herbicide on competing stems 1 to 2.9 inches in diameter and using tree injection or "hack and squirt" cut surface treatment to apply a small amount of diluted herbicide to the stems of individual competing trees 3 to 8 inches in diameter.
5 Requires ¼ mile of temporary road construction for access.
6 Requires an existing temporary road be used for access.

Regeneration of new forest stands would be accomplished by site preparation and reforestation methods as outlined below:

- On three cable logging units (95-01, 95-08, 95-40, 95-36 and 95-37) totaling approximately 77 acres, prior to harvest operations, competing tree species less than merchantable size would be treated with an herbicide with the active ingredients Glyphosate or Triclopyr to control competition from those species (for all herbicide applications in all alternatives, Glyphosate would be applied at rates outlined on the label and Triclopyr would be applied at up to 4 pounds of active ingredient per acre as outlined in the revised application rates for the VMAM which is also included in Appendix G of this document);
- Following logging operations, a regeneration survey would be conducted to determine whether an area had sufficient natural regeneration from seed, seedlings, or sprouts. If not, seedlings would be planted at a rate per acre that would supplement natural regeneration to create fully stocked stands. After 3 to 4 growing seasons, streamline release using an herbicide with the active ingredient Triclopyr would be used, if needed, to maintain adequate stocking of desirable tree species. These areas would be managed for forest types similar to those occurring before harvest;
- In all stands (except 95-01, 95-08, 95-40, 95-36 and 95-37) following logging operations, competing tree species between 2-inch diameter breast height (dbh) and 10-inch dbh that were not knocked down or cut during logging would be treated with an herbicide containing the active ingredient Glyphosate or Triclopyr to control competition from those species. Merchantable tree species not cut during logging, excluding reserved trees and undamaged residual northern red oak, white oak, chestnut oak, hickory, ash and yellow-poplar 6-inch dbh or larger, would be cut with chainsaws. A regeneration survey would be conducted to determine whether an area had sufficient natural regeneration from seed, seedlings, or sprouts. If not, seedlings would be planted at a rate per acre that would supplement natural regeneration to create fully stocked stands. After 3 to 4 growing seasons, streamline release

using herbicides would be used, if needed, to maintain adequate stocking of desirable tree species.

- In addition to a herbicide site preparation treatment on one area totaling approximately 25 acres (a portion of 107-02), the area would receive an underburn if weather conditions permit to reduce brush and logging slash and force basal sprouting on hardwood stumps. The following winter, shortleaf and/or pitch pine would be planted on a 12-foot by 12-foot spacing, which is wide enough to allow concurrent development of desirable hardwoods, especially oaks. Hardwood inclusions, such as moist coves, would not be planted, but would be managed for hardwood regeneration. After 3 to 4 growing seasons, streamline release using herbicides would be used if needed to maintain adequate stocking of oak, pine and other desirable tree species.

In addition to regeneration of new forest stands, the following activities would occur:

- Use and maintain the existing road system;
- Designate 296 acres of small patch old growth by compartment and an estimated 475 acres of medium patch old growth near Horsepen Creek;
- Site preparing and subsequent release, if needed, in all stands being regenerated using herbicides and manual methods;
- Prescribe burn approximately 350 acres within Compartment 90, and a portion of stand 107-02 if weather conditions allow;
- Expand existing one acre wildlife field adjacent to Stand 95-27 to 2.5 acres;
- Daylight to create a feathered edge of early successional habitat for an average additional width of 15 feet on each side of FSR 299. This daylighting would be done along much of the length to within 30 feet of the private in-holding but would not be done where topography prohibits it or where no-harvest standards for perennial or intermittent stream crossings occur. Following harvest, revegetate roadbed into alternating patches of clover/warm season vegetation to restore the grass/forb condition;
- Plant individuals or groups of persimmons and/or native crabapple trees in log landings and in the existing/expanded wildlife field adjacent to Stand 95-27;
- Following harvest activities, create one vernal pond off the Little Chestnut Mountain Road;
- Anchor large woody debris into about one mile of streambank along Timbered Branch Creek to enhance aquatic habitat by balancing the pool:riffle ratio;
- Use Glyphosate herbicide to control a total of about one acre or less of the following invasive exotic (non-native) plants along the following roads prior to disturbance activities:

Table 2-5: Location of Invasive Exotic Plants Control – Alternative C

Forest Service Road	Japanese plume grass (***Miscanthus sinensis***)	Tree-of-heaven (***Ailanthus altissima***)	Princess tree (***Paulownia tomentosa***)
4096	X	X	
4099		X	X
299		X	X
986	X	X	X
Old Way Ridge	X	X	X
4101	X	X	X
982	X		

- Native plants would be utilized in wildlife habitat improvement and roadside erosion control;

- Hemlock four inches to eight inches in diameter not affected by the hemlock wooly adelgid within stands 93-02, 94-02, and 94-01, would be retained during harvest and stand improvement activities to maintain winter roost habitat for many bird species, including ruffed grouse;
- During timber stand improvement, soft mast species of holly, black gum, and dogwood would be maintained to ensure continued production of food utilized by numerous bird species and mammals; and
- Species priority for residual tree designation would be; white oak, red oak, and hickory, where present within harvest stands.

2.3 Alternatives Considered but Eliminated from Detailed Study

As per 40 CFR 1502.14(a), the following alternatives were considered but eliminated from detailed study:

2.3.1 Alternative 1 – Designate a 499-acre Medium Patch Old Growth in lieu of Small Patch Old Growth

This alternative focused on designating a medium patch old growth near Horsepen without designating small patch old growth by compartment. The Forest Plan requires small patch old growth be designated in compartments prior to ground disturbing activity unless 5 percent of the compartment is already part of a large or medium patch (Forest Plan, pages III-26 and 27). Within the Upper Creek analysis area, there is a 17,100-acre large patch old growth designated (Patch 29, Steels Creek-Upper Creek-Wilson Creek, Forest Plan, page K-8). However, this large patch does not make up at least 5 percent of each compartment in the analysis area. Designating the medium patch near Horsepen exclusive of small patch old growth by compartment, will not meet Forest Plan standards for small patch old growth. As a result, this alternative was eliminated from detailed study as a result.

2.3.2 Alternative 2 – No Timber Harvesting or Temporary Road Construction

This alternative focused on an ecosystem restoration proposal without commercial timber harvest. Prescribed burning, wildlife habitat improvement, stream improvement/restoration, and control of invasive exotic plants would still occur. This alternative was dropped from detailed study because it did not meet the Upper Creek Purpose and Need, nor was it consistent with Forest Plan standards and guidelines for Management Area 1B, 2A, and 3B (Forest Plan, pages III-60, 68, and 75). This alternative does not provide a supply of wood products to meet public demands, nor is it reasonable to assume that funding would be available to accomplish the recreation, wildlife, and prescribed fire improvement projects. In addition, the use of prescribed fire alone is not a reasonable method of accomplishing regeneration objectives over a large number of acres because it is not possible to pick the desirable individual residual trees over less desirable species. The use of stand replacement fire to accomplish regeneration objectives is also not a reasonable alternative as it would be difficult to safely implement and does not meet Forest Plan standards and guidelines for Management Area 1B, 2A, and 3B. Similarly, a cut and leave treatment to accomplish regeneration objectives would not supply wood products to meet public demand and would lead to significant concerns with hazardous fuel loadings and subsequent destructive wildfires within the analysis area. Portions of this alternative are also met with Alternative A – No Action.

2.4 Mitigation Common to All Alternatives

Mitigation is defined as actions to avoid, reduce, eliminate, rectify or compensate for undesirable effects from proposed activities (40 CFR 1508.20). Mitigation measures are necessary for scenery (listed below), prescribed fire, and herbicide (listed in Appendix F). The action alternatives share these mitigation measures, and unless noted otherwise in the decision document, they would become mandatory if the responsible official selects an action alternative for implementation. No mitigation measures for biologic resources were determined to be necessary (Appendix A, Biological Evaluation, Mitigation Measures and Project Design Features).

- C Move upper unit boundary of stands 95-08 and 95-40 one tree-height below ridge. Maintain 25-30 basal area/ac to screen and blend-in harvest activities as seen from trail 273
- D Harvest openings along open system roads in stands 90-03, 92-05A, and 92-05B should not exceed 500 linear feet

2.5 Comparison of Alternatives by Key Issue

The following table compares environmental effects of alternatives by key issue:

Table 2-6: Comparison of Environmental Effects of Alternatives by Key Issue

Key Issue	Indicators	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C
Key Issue#1: Water Quality and Aquatic Habitat	Number of new stream crossings	0	1	1
	Miles of temporary road constructed	0	0.25	0.25
	Type of watershed enhancement activities	0	Large woody debris placed in Timbered Branch	Large woody debris placed in Timbered Branch
Key Issue#2: Wildlife Habitat/Fragmentation	Acres of grass/forb openings expanded	0	0	1.0
	Acres of grass/forb landings planted	0	10.5	10.5
	Miles of road daylighted	0	0	1.8
	Percent of grass/forb openings	0.2	0.28	0.29
	Habitat connectivity	Maintained	Maintained	Maintained

Key Issue	Indicators	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C
Key Issue #3: Age-class Distribution	Age-class Distribution			
	Upper Creek Analysis Area			
	0-10 years old	1.1%	3.5%	3.5%
	11-20 years old	9.6%	9.6%	9.6%
	21-30 years old	4.4%	4.4%	4.4%
	31-40 years old	2.7%	2.7%	2.7%
	41-50 years old	1.0%	1.0%	1.0%
	51-60 years old	0%	0%	0%
	61-70 years old	6.5%	6.5%	6.5%
	71-80 years old	30.8%	30.5%	30.5%
	81-90 years old	29.5%	28.6%	28.6%
	91-100 years old	11.0%	9.8%	9.8%
	101+ years old	3.4%	3.4%	3.4%
	Wilson Creek Analysis Area			
	0-10 years old	1.8%	2.4%	2.4%
	11-20 years old	8.3%	8.3%	8.3%
	21-30 years old	2.5%	2.5%	2.5%
	31-40 years old	2.8%	2.8%	2.8%
	41-50 years old	1.0%	1.0%	1.0%
	51-60 years old	0.6%	0.6%	0.6%
	61-70 years old	3.7%	3.7%	3.7%
	71-80 years old	22.7%	22.7%	22.7%
	81-90 years old	36.5%	35.9%	35.9%
	91-100 years old	15.6%	15.6%	15.6%
	101+ years old	4.5%	4.5%	4.5%
Key Issue #4: Old Growth Habitat	Acres treated by age class	0	0	0
	Acres of newly designated old growth	0	296	771 (est.)

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CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

This chapter forms the scientific and analytical basis for the comparison of alternatives as required by the National Environmental Policy Act (NEPA). Included in this chapter are disclosures of direct, indirect, and cumulative effects of the alternatives on the different resources relevant to the key issues. Direct and indirect effects occur at, or near the same time and place as a result of the action [40 CFR 1508.8 (a) and (b)]. They have been combined in this chapter, as it is difficult to completely separate between the two effects. Cumulative effects result "*…from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such action. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time"* (40 CFR 1508.7). Reports from different resource specialists supplied information for portions of the analysis in this chapter. The project area is the location of the proposal. The analysis area is the anticipated extent of effects by resource and is generally larger than the project area.

Effects analyses are disclosed by key issue in this chapter. The four key issues associated with this proposed project were identified through a public participation process, which included input from Forest Service natural resource specialists, other government agencies, organizations, and individuals (see Section 1.6, Chapter 1). The key issues were determined to be relevant to the decision to be made concerning the Steels Creek Project. Other resources and issues (non-key issues) were eliminated from discussion in this chapter (see Section 1.7, Chapter 1).

3.1 Key Issue #1 – Water Quality and Aquatic Habitat

Issue Statement: *The proposed action may adversely affect water quality*

Indicators:
- ◊ Number of new stream crossings
- ◊ Miles of temporary road constructed
- ◊ Type of watershed enhancement activities

Additional analysis on aquatic habitat is disclosed in Appendix A, Biological Evaluation and Appendix G, MIS. This analysis addresses project area waters and analysis area (AA) waters. Project area waters are defined as those in the area of potential site-specific impacts on aquatic habitat and populations. The analysis area encompasses waters downstream that potentially could be impacted by project activities, in addition to project area waters.

3.1.1 Existing Condition

Substrate within the project area waters (see following table) was evaluated and visually estimated. The three primary types of substrate that existed were documented at each macroinvertebrate sample site. This information is valuable for determining the amount of habitat available for PETS species, MIS species as well as any other aquatic organisms.

Table 3-1: Forest Plan Administrative Watersheds 57(Upper Creek), 58(Parks Creek), and 59(Wilson Creek)

Stream Name (UT denotes an unnamed tributary)	Compartment-Stand	Miles in Project Area	Miles in Analysis Area	DEM Classification*
Upper Creek	93, 94, 107	0.8	2.6	WS-III, Tr, ORW
UT 1	94-01	0.11	0.11	WS-III, Tr, ORW
UT 2	107-02	0.4	0.8	WS-III, Tr, ORW
UT 3	107-02	0.2	0.2	WS-III, Tr, ORW
UT 4	107-02	0.2	0.2	WS-III, Tr, ORW
Timbered Branch	95, 87	2.2	2.2	WS-III, Tr, HQW
UT 1	95-08	0	0.4	WS-III, Tr, HQW
UT 2	95-08	0	0.5	WS-III, Tr, HQW
Pearcey Creek	92-05	0.2	0.8	C
UT 1	92-05	0.6	0.8	C
UT 2	92-05	0.4	0.9	C
Carroll Creek	90-05,03	0.4	0.9	C, Tr
UT 1	90-03	0.4	0.4	C, Tr
UT 2	89-01	0.4	1.0	C, Tr
Craig Creek Watershed Project		288 feet	2.5 miles	C, Tr, ORW

* The NC Department of Environmental Management designates classifications and water quality standards known as "Classifications and Water Quality Standards Applicable to the Surface Waters and Wetlands of North Carolina." The "WS-III indicates waters protected as water supplies which are generally in low to moderately developed watersheds and suitable for all class "C" uses. The "C" classification denotes waters suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. "ORW," or outstanding resource waters, indicates waters of unique and special waters of exceptional state or national recreational ecological significance which require special protection to maintain.

Pearcey Creek is located adjacent to Compartment 92 Stand 05 and crossed by Forest Service Road (FSR) 4101. All culverts on this road are in good working condition. The average width of Pearcey Creek where FSR 4101 crosses is approximately 4 feet and a maximum of 6 feet. Substrate consists of 50% bedrock, 30% cobble, 10% gravel, and 10% sand and silt. Fish habitat exists approximately 100 meters downstream of where FSR 4101 intersects Pearcey Creek.

An unnamed tributary (UT) to Pearcey Creek is also crossed by FSR 4101 (see UT map at end of Chapter). This intermittent stream intersects another intermittent channel approximately 100 feet down slope of the crossing with FSR 4101 where it becomes perennial. Since these two intermittent channels are within Compartment 92 Stand 05 there will be a 30 foot designated "no cut" riparian area on either side of the stream channel. Where the stream becomes perennial there will be a 100 foot riparian area designation. The substrate within UT 1 Pearcey Creek is 70% cobble and 30% gravel and sand. Another small unnamed tributary to Pearcey Creek is crossed by FSR 4101 within Compartment 92 Stand 05. This small tributary, UT 2, has little to no habitat for aquatic organisms and contains mostly cobble and silt habitat.

The unnamed tributary to Upper Creek (UT 2 Upper Creek) associated with Compartment 107 Stand 02 is located outside of the project area but is within the analysis area. The section of this tributary that runs adjacent to the stand contains very little fish habitat due to restricted flow regimes and little flow. Substrate consists of cobble with gravel and sand. The other two drainage areas within the stand are dry and contain no substrate, only vegetation.

The unnamed tributary to Upper Creek (UT 1 Upper Creek) associated with Compartment 94 Stand 01. This small perennial stream is crossed with a culvert by FSR 986. The substrate within this stream is gravel, sand and silt with restricted flow regimes. There is no fish habitat.

Compartment 94 Stand 01 is approximately 300 feet from the main stem of Upper Creek. Upper Creek supports a wide variety of fish species listed in the table above. Habitat was surveyed during the spring of 2003 by USFS district technicians trained in the basin-wide visual estimation technique or BVET (Doloff, et.al.1993). Habitat within Upper Creek was visually estimated for approximately 1.3 miles. Substrate consisted of 30% boulders, 25% sand, 20% cobble, 15% silt, and 10% gravel.

Timbered Branch runs adjacent to Compartment 95 Stands 36 and 37 and Compartment 95 Stand 01. The existing condition of Timbered Branch is affected by the presence of FSR 982. This road is parallel to Timbered Branch for approximately 1.5 miles. Several projects within this area have improved aquatic habitat including a large woody debris project in the 1980s and a cooperative best management practices effectiveness project with the NC Department of Environmental Management's Water Quality section. The district has also performed dispersed recreational improvements that have aided in controlling run-off. Timbered Branch was evaluated for habitat which consisted of primarily cobble (60%), 20% small boulders, 10% gravel and 10% sand and silt. There is a pool to riffle ratio of 1:1, which was created by the early 1990s large woody debris project.

The unnamed tributaries to Timbered Branch associated with Compartment 95 Stand 40 are located below the project activity. The drainage areas within the stand were evaluated for aquatic habitat and little to none existed. These streams are high gradient with restricted flow regimes. Outside the project area in UT 1 Timbered Branch and UT 2 Timbered Branch habitat consisted of small cobble and gravel. Neither of these tributaries were more than 1 meter wide below the project area.

Carroll Creek is associated with Compartment 90 stands 03 and 05. Substrate within Carroll Creek consists of 45% boulders, 40% gravel, 10% cobble, and 5% organic. The average depth is 8 inches with a maximum of 2 feet. The average width is approximately 12 feet with a maximum of 20 feet. Both Carroll Creek and the unnamed tributary to Carroll Creek are impacted by road run-off from FSR 299 and FSR 4096. Improvements have been made by the Grandfather Ranger District's personnel that is effectively keeping sediment and off highway vehicles out of Carroll Creek and its tributaries. The project area of the unnamed tributary to Carroll Creek adjacent to Compartment 90 stand 03 is a low gradient stream. This stream was evaluated for aquatic habitat. Fifty percent of the substrate observed was silt and sand, 30% cobble and 20 percent gravel. It appears as though the gradient is so slight in this tributary that the flushing of natural sediments does not occur. No failures to best management practices (BMPs) were noted on FSR 4096 which runs parallel to this unnamed tributary to Carroll Creek for approximately 0.4 miles. The headwaters of UT 2 Carroll Creek flows parallel to Stand 89-01—habitat within this UT exhibit similar characteristics of Carroll Creek.

There is no harvest activity proposed in the Craig Creek drainage area. However, the USFS National Forests in North Carolina's Hydrologist, Brady Dodd has proposed a watershed restoration project on Craig's Creek. The creek is currently heavily impacted. Historically, Craig Creek was moved from its original channel into a man-made channel that is currently heavily eroded and causing sedimentation of habitat. The watershed project would redirect the

flow of Craig Creek into its natural abandoned channel and enhanced for fish and aquatic species habitat. Enhancements would include large woody debris placement and reconnection with the natural floodplain. A detailed description of the project is included in Attachment 4.

Culverts along FSRs 4099, 982A, 982, 986, 987, 4102, 299, and 4096, the roads themselves, and existing old roads and skid trails in the project area are the existing threats to the streams and drainages. Impacts from these sources are limited to down slope movement of sediment from road runoff and culvert fills. It is suspected that sediments from these sources are deposited in the natural vegetative filters before they reach areas of perennial water since some of the roads (FSR 4099, 982A, 986, and 987) are closed to all but administrative and fire control traffic (i.e. road disturbance is limited). FSR 4102, 299, and 4096 are open seasonally and FSR 982 is open year-around. There were no culverts found within the analysis area that were non-functioning. All stream crossings are in good working condition.

Fish habitat exists within the project areas of Timbered Branch and Upper Creek. Although habitat exists in the project area of Carroll Creek, no fish were found during project surveys or during the 1994 Brook Trout Distribution Surveys conducted by the USFS and the NCWRC. There is limited habitat for fish species within the other project area waters, due to small stream size and restricted flow regimes. Project area waters provide habitat for macroinvertebrates.

3.1.2 Summary of Alternatives

The following table displays the number of stream crossings, miles of temporary road, and type of watershed enhancement activities proposed by alternative:

Table 3-2: Stream Crossings, Temporary Roads, and Watershed Enhancement Activities by Alternative

Indicators	Alternative A	Alternative B	Alternative C
Number of new stream crossings	0	1	1
Miles of temporary road constructed	0	0.25	0.25
Type of watershed enhancement activities	n/a	Large woody debris placed in Timbered Branch	Large woody debris placed in Timbered Branch

The following table discloses a summary of effects by alternative:

Table 3.3 – Summary of Effects to Aquatic Resources by Alternative

	Summary of Effects		
Resource Area	Alternative A	Alternative B	Alternative C
Effects on aquatic MIS	Existing habitat and population trends continue.	Existing habitat and population trends continue.	Existing habitat and population trends continue.
Effects on water quality (Associated with the amount of soil disturbance)	No change from existing condition.	No expected turbidity and sediment loading expected. May increase slightly during bridge installation and implementation of the Craig Creek Restoration.	No expected turbidity and sediment loading expected. May increase slightly during bridge installation and implementation of the Craig Creek Restoration.

	Summary of Effects		
Resource Area	Alternative A	Alternative B	Alternative C
		Should diminish downstream and cease with site rehabilitation.	Should diminish downstream and cease with site rehabilitation.
Effects on aquatic habitat and populations	Existing habitat and population trends continue.	May temporarily affect aquatic habitat in Carroll Creek (bridge installation) and Craig Creek (during restoration) but will improve over time.	May temporarily affect aquatic habitat in Carroll Creek (bridge installation) and Craig Creek (during restoration) but will improve over time.
Effects to riparian areas	Remain in present state. Aquatic habitat will improve, as riparian areas grow older.	Remain in present state except at stream crossing on Carroll Creek. Aquatic habitat would improve, as riparian areas grow older, increasing large woody debris in streams.	Remain in present state except at stream crossing on Carroll Creek. Aquatic habitat would improve, as riparian areas grow older, increasing large woody debris in streams.
Effects of herbicide	No impact	No impact as no spraying will occur within the riparian areas of streams.	No impact as no spraying will occur within the riparian areas of streams.
Effects of prescribed burning	No impact	Burning activity within riparian areas would not be intense enough to destroy riparian vegetation	Burning activity within riparian areas would not be intense enough to destroy riparian vegetation

3.1.3 Effects of Access Management on Aquatic Resources

3.1.3.1 Alternative A Direct and Indirect Effects

Implementation of this alternative would perpetuate the existing condition described above. Aquatic habitat quality and quantity and populations would continue in their natural dynamic patterns. It is important to note that natural processes include aspects such as extinction of species and loss of habitat types. There would be no impacts upon the twelve Forest concern species or the three MIS species from implementation of this alternative.

3.1.3.2 Alternatives B and C Direct and Indirect Effects

Direct Effects

Access to the proposed units will involve the construction of 0.25 miles of temporary road off of Old Way Ridge Road (FS 9824) and the development of skid trails and log landings. The new temporary road construction is occurring up near Old Way Ridge and away from any aquatic resources. Riparian areas have been identified as 100 feet on either side of perennial channels and 30 feet on either side of intermittent channels. No activity, including the placement of log landings and skid trails, will occur in this area with the exception of stream crossings. There is only one new stream crossing proposed with the Upper Creek Project which is a bridge across Carroll Creek to access Compartment 90-05.

The Carroll Creek stream crossings has been designed so that it will be least impacting on the project area's aquatic resources. Carroll Creek will be crossed perpendicular to its channel so the

access road enters the riparian area, crosses the stream, and exits the riparian area. Road drainage will be designed so it flows off the roaded area and enters into vegetation rather than directly into project area streams. Bridges allow for the movement of aquatic organisms by maintaining habitat under the crossing.

More mobile aquatic species such as aquatic salamanders, crayfish and fish will emigrate downstream away from the disturbed area during bridge installation. The loss of less mobile individuals such as macroinvertebrates will likely occur during this process. It is unlikely that the less mobile fish species within the aquatic analysis area will be impacted due to their absence within the project area.

Sedimentation of aquatic habitats within the aquatic analysis area could result in the loss of clear-flowing spring habitats and valuable headwater stream origins. Aquatic species utilizing these areas (such as the dragonflies) could be locally lost. Spawning areas for fishes occupying downstream reaches of Timbered Branch, Upper Creek and Pearcey Creek could also be reduced or lost to sedimentation. Stream gradients and flow regimes within the analysis areas may not be dynamic enough to rely on natural flushing to occur. Therefore, any losses have the potential to be permanent.

Access to the other compartments and stands include the roads proposed in Alternative B. These existing roads include; FSR 4099, 982A, 986, 897, 4102, 299, 4096. There are no new stream crossings associated with these roads. Where there are existing crossings, no additional work will be necessary as they are in good working condition.

Indirect Effects

There may be off-site movement of soil into project area waters from temporary road construction and the bridge construction. Turbidity and sediment loading can cause mortality by injuring and stressing individuals or smothering eggs and juveniles. Available habitat, including the interstitial space within substrate used as spawning and rearing areas, may be covered with sediments. Episodic fluctuations in turbidity may occur after soil disturbance ends because sediments deposited within the stream bed may be re-suspended during high flow events (Swank *et al*. 2001). If habitat complexity is lost through sedimentation, a shift in the aquatic insect community could occur that favors tolerant macroinvertebrates. Larger, more mobile aquatic species, such as fish and hellbenders are able to temporarily escape the effects of sedimentation by leaving the disturbed area. Eggs and juveniles may be lost to reduced habitat or suffocation. This can result in the loss of or reduced year class strength, which can lead to accelerated population fluctuations and suppressed population levels. Over time, these species will recolonize areas as habitat conditions improve.

Smaller less mobile organisms such as crayfish and aquatic insects may not be able to move to more suitable habitat. Populations of these species may decline locally or be lost through reduced productivity. These may recolonize from reaches of undisturbed streams as conditions improve with site rehabilitation. Implementation of the contract clauses and erosion control precautions described above should minimize sediment effects and accelerate site rehabilitation.

Skid trails and the temporary road construction may also cross ephemeral streams or spring seeps that feed these streams and others in the project area. If heavy rains occur while these ephemeral crossings are exposed, bare soil can be transported down slope to intermittent and ephemeral stream channels. Temporary stream crossings should be used across ephemeral channels to avoid the potential for sedimentation of down slope aquatic resources. These crossings could

include the use of temporary bridges (e.g. simple log stringers or pre-fabricated decking) or culverts, or channel armor (e.g. stone or brush).

3.1.4 Effects of Timber Harvest on Aquatic Resources

3.1.4.1 Alternative A Direct and Indirect Effects

The existing condition of aquatic resources has been described above. Natural fluctuations in population stability, and habitat quality and quantity would continue.

3.1.4.2 Alternative B Direct and Indirect Effects

North Carolina Forest Practices Guidelines (NC FPG) and Forest Plan standards would be applied to the harvest activity. Applications of Forest Plan standards are intended to meet performance standards of the state regulations. Visible sediment, derived from timber harvesting, defined by state regulations should not occur unless there is a failure of one or more of the applied erosion control practices. Should any practice fail to meet existing regulations, additional practices or the reapplication of existing measures will be implemented as specified by state regulations.

3.1.4.3 Alternative C Direct and Indirect Effects

Effects of timber harvest to aquatic resources would generally be the same as Alternative B. The only difference is the management method for Compartment 107 Stand 02. With alternative B, this stand is a two-age harvest where in Alternative C it is a clearcut. From an aquatics stand point, there would likely be no difference between alternative B and C. Both alternatives will protect aquatic resources with a 30-foot buffer around intermittent streams and a 100-foot buffer on perennial streams. Compartment 107 Stand 02 has two ephemeral drainage areas located in the middle of the stand. During project area surveys, there was no water located in either of these drains. However, during heavy rainfall there could be some surface water flowing through these drainage areas. Either the clearcut or the shelterwood harvest will likely increase the amount of water that flows through these ephemeral channels during storm events. The implementation of Alternative C would likely increase the drainage than B but would not have any negative impacts on aquatic resources. No skidding would occur across these drains and trees would be directionally felled away from these channels reducing the risk of any sediment reaching UT Upper Creek or Upper Creek.

3.1.5 Effects of Timber Harvest on Water Quality

3.1.5.1 Alternative A Direct and Indirect Effects

The existing condition of aquatic resources has been described above. Natural fluctuations in population stability, and habitat quality and quantity would continue.

3.1.5.2 Alternatives B and C Direct and Indirect Effects

Water quality should not be affected as long as Forest Plan and NC FPG standards are followed and timber sale contract clauses are implemented. Stream temperatures would not be affected because adequate shade would be maintained along perennial and intermittent streams.

3.1.6 Effects of Timber Harvest on Riparian Areas

3.1.6.1 Alternative A Direct and Indirect Effects

The existing condition of aquatic resources has been described above. Natural fluctuations in population stability, and habitat quality and quantity would continue.

3.1.6.2 Alternative B Direct and Indirect Effects

There is no plan to harvest within the 100-foot riparian area of any analysis or project area streams. The only cutting within the riparian areas is associated with the crossing at Carroll Creek discussed above. There is the possibility that as trees are cut, they will cross a stream channel or spring. While large woody debris in and adjacent to stream channels is desirable for aquatic habitat diversity, it needs to be of the same scale as the channel size and type. The scales of the trees and stream channels do not match, and it is possible that leaving large tree boles in the channels and across springs could result in flow obstruction, which can lead to accelerated bank scouring and failure, and subsequently, sedimentation of local and downstream channels. To avoid the potential for this habitat loss, trees accidentally felled across stream channels or springs should be removed. "Drag lanes" should not be designated for the removal of these trees to avoid severe bank disturbance. Rather, trees should be removed individually, from where they fell. It is unlikely that pulling individual trees across will result in permanent stream bank damage. Any damage done to the stream banks will most likely be temporary, as there is an abundance of herbaceous vegetation along the banks that will quickly recolonize bare soil.

3.1.6.3 Alternative C Direct and Indirect Effects

Effects to aquatic resources would generally be the same as Alternative B. The clearcut associated with Compartment 107-02 will cause greater surface run-off and likely increase the amount of water that flows down the two ephemeral drainage areas within the stand.

3.1.7 Effects of Herbicide Use

3.1.7.1 Alternative A Direct and Indirect Effects

There would be no effect under this alternative as herbicide use is not proposed.

3.1.7.2 Alternatives B and C Direct and Indirect Effects

The use of herbicide methods for silvicultural treatments is analyzed in detail in the Vegetation Management Environmental Impact Statement for the Southern Appalachians (Section 1.2, Chapter 1). Included in this document is a detailed analysis of the effects of silvicultural treatments on aquatic resources. No herbicide would be used in the 100-foot designated riparian area of any perennial streams within the Upper Creek Project and no herbicide would be sprayed within the 30-foot designated riparian area of any intermittent streams within the project area (see also Section 1.7.2.2, Chapter 1).

3.1.8 Effects of Prescribed Burning

3.1.8.1 Alternative A Direct and Indirect Effects

There would be no effect under this alternative as prescribed burning is not proposed.

3.1.8.2 Alternatives B and C Direct and Indirect Effects

Both alternatives involve a 350-acre prescribed burn in Compartment 90. No fire line construction is planned as the burn would be contained by existing trails in the Brown Mountain

Off Road Vehicle area. Late winter or early spring burns are typically of low intensity. Any burning activity within riparian areas would not be intense enough to destroy riparian vegetation. If fire lines are needed, they would be constructed with hand tools. If mineral soil is disturbed within riparian areas, it is possible that erosion could occur. Prescribed burn areas are inspected after treatment. Areas of erosion are identified and controlled during inspection to eliminate stream sediment sources. There would be no effect to aquatic resources from this activity.

3.1.9 Effects of Large Woody Debris (LWD) Placement in Timbered Branch

3.1.9.1 Alternative A Direct and Indirect Effects

There would be no effect under this alternative as LWD placement is not proposed.

3.1.9.2 Alternatives B and C Direct and Indirect Effects

A large woody debris (LWD) project is proposed in Timbered Branch as a part of the Upper Creek Project. Large wood within a stream is defined as woody debris greater to or equal to 10 centimeters in diameter (Meehan, 1991). Large wood contributes to structure and hiding cover, maintains physical stability and provides a range of habitats for stream organisms (Dolloff, 1986). LWD will also provide for a well balanced pool to riffle ratio within Timbered Branch. A well balanced ratio of these two habitats allows for species diversity. A similar project was conducted in the late 1970's. Some of the LWD put into place then, is still effective today. The implementation of this aspect of the Upper Creek Project will enhance habitat for all aquatic species, including rare species in approximately two miles of trout stream.

3.1.11 Cumulative Effects

There should be no adverse cumulative effects to the analysis area aquatic resources, based on the project's design features listed in Sections 2.2.3 and 2.2.4, Chapter 2. Past projects and events within the analysis area include private and Forest Service timber projects, including Pearcey Creek (late 1990's), Little Chestnut (mid 1990's), and Timbered Branch (1990's). Other disturbances within the analysis area include a dam on private lands located on UT 2 Upper Creek (downstream from the project area), the Upper Creek area watershed improvement project which is to be completed in 2005, illegal off highway vehicle (OHV) use, and a 140-acre wildfire in the Chestnut Mountain area that occurred in November 2001.

Two tropical storms moved through the project and analysis areas in September 2004 during an 8 day period, both producing 100-year flood events. Both storms released up to 14 inches of rain within 48 hours. Many streams within the Catawba drainage were heavily impacted by the storm events. The streams within the Upper Creek Project area were affected by the storm events. As observed in other watersheds across the Pisgah National Forest, often these large storm events act as a "restart mechanism" for cumulative effects. Substrates have been cleaned or washed out, creating habitat for aquatic organisms which rely on interstitial space, or the space between substrate particles. Interstitial space is especially important for trout species which spawn over clean substrates that allow for oxygen to reach the eggs and juveniles.

The lower part of this AA remains heavily impacted by private land use. On National Forest System lands, impacts to the watershed include dispersed campsites, roads, illegal OHV use, and the Brown Mountain OHV area. The Grandfather Ranger District has several ongoing projects to eliminate impacts to the area's aquatic resources. These include the enforcement of illegal OHV use, maintenance of Forest Service roads, the improvement and/ or removal of campsites

from within riparian areas in the watershed which are improving riparian vegetation, preventing vehicles from entering area streams, and preventing off-site movement of soil. As a result, the expected cumulative effects should not be any greater than the direct effects disclosed above. There are no expected adverse cumulative effects anticipated with these alternatives when their direct and indirect effects are combined with the past actions displayed in the following table and the flood events and actions described below:

Table 3-4: Past Activity within the Upper Creek and Lower Wilson Creek Analysis Areas by Year[1]

Analysis Areas	Year	Compartment(s)	Volume (ccf)	Acres
Upper Creek	1994	95, 96	2,350	115
Lower Wilson Creek (LWC)	1991	90, 91, 92, 93	2,205	92
Total Harvest Related			4,555	307
Wildfire	1981-2004			3,500
Prescribed Fire	1981-2004			300
Total Fire Related				3,800

1 No additional Forest Service timber sales are planned in the analysis areas over the next 10 years. A landowner is proposing to harvest 100 acres of private land adjacent to compartments 87 and 88 to be implemented in the next two years.

3.2 Key Issue #2 – Wildlife Habitat/Fragmentation

Issue Statement: *The proposed action may impact wildlife habitat*

Indicators:

- Acres of grass/forb openings expanded
- Acres of grass/forb landings planted
- Miles of road daylighted
- Percent of grass/forb openings
- Habitat connectivity

Additional analysis on aquatic habitat is disclosed in Appendix A, Biological Evaluation and Appendix G – MIS. The analysis area (AA) for wildlife is the Upper Creek and Wilson Creek watersheds. The following table displays habitat proposed for treatment by alternative:

Table 3-5: Habitat Proposed for Treatment by Alternative (early successional habitat created; 0-20 years)

Action	Alternative A	Alternative B	Alternative C
Early Successional (ac)	0	385	385
Grass/Forb Openings Expanded (ac)	0	0	1.0
Grass/Forb Planted Landings (ac)	0	10.5	10.5
Daylighting/Early Successional (ac & mi)	0 & 0	0 & 0	6.5 & 1.8

3.2.1 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative, the early successional habitat (0-20 years) would remain at 2,584 acres, or 11 percent of the analysis area; the grass/forb openings would remain at 0.2 percent, which currently does not meet required Forest Plan minimum standards (Forest Plan, page III-23); and habitat connectivity would be maintained. There would be no adverse cumulative effects with this alternative when combined with past activities listed in Table 3-4 above.

3.2.2 Alternatives B & C – Direct, Indirect, and Cumulative Effects

Both alternatives propose about 385 acres of early successional habitat (0-20 years). Converting these acres to early successional habitat would have positive, adverse, or no effects depending on individual species.

Cumulative Effects Summary

There would be no adverse cumulative effects with this alternative when combined with past activities listed in Table 3-4 above. Within five years, the increase in soft mast production will somewhat offset any loss of hard mast production through the regeneration harvest proposed, resulting in a slight recovery. With the marking guidelines retaining hard mast species where they exist, the loss of hard mast production from the regeneration activity would be minimal. No changes to the integrity of Bird patch #37 are proposed and the Craig Creek Watershed project would benefit resource conditions within this bird patch.

The proposed Craig Creek Watershed project involves returning the creek to its original location. The project to delineate the dispersed campsites along Timbered Branch Creek and the intersection of Forest Service Roads (FSR) 197 and 286 is on-going. This project has resulted in less bare soil and vehicle traffic within the areas immediately adjacent to the creeks. The campsites being delineated and hardened, along with the toilet facility are outside of the immediate riparian corridor of Upper Creek. These recreation and soil and water resource projects will benefit wildlife species within the analysis area by maintaining wildlife access to water sources and the integrity of the riparian areas. Hunter et al (1999) concluded that most riparian areas were cleared decades ago for farmland, residential areas, businesses, and roads. Approximately 65,000 acres of riparian habitat is currently present within the Southern Blue Ridge region, with over 90% occurring at low elevations on private lands (Hunter et al 1999).

There have been approximately 3,500 acres of wildfires within these analysis areas since 1981 and approximately 300 acres of prescribed fire. This fire history has resulted in an average of about 165 acres per year being burned. Where these fires occurred, the shrub layer has been reduced and scattered tree mortality occurred. Wildfires and prescribe burns rarely enter riparian areas where they exhibit cool, low intensity flame heights within this moist environment.

The southern pine beetle (SPB) epidemic within the past 5 years has resulted in large clumps and scattered yellow pine species mortality, especially along ridge tops on the south end of the Upper Creek AA. Natural regeneration is occurring, and a prescribed burn is planned in the vicinity to reduce the dead and down debris which may be interfering with regeneration to a fully stocked condition.

Threatened, Endangered, and Sensitive Wildlife Species

No known threatened or endangered (T&E) species or their habitat occurs within the analysis area; therefore there would be no direct, indirect, or cumulative effect to T&E species or their habitat. The regionally Sensitive (S) Eastern small-footed bat is known to occur in the analysis area, and the Diana Fritillary (S) is known to occur in the activity area.

<u>Eastern Small-footed Bat</u>

If harvesting is carried out during October through March time frame, the Eastern small-footed bat would be hibernating within caves, most prevalent within the northern portion of the Upper Creek drainage, more than a mile from the proposed activities. During late spring through early fall, this species may be found utilizing hollow trees and rock crevices. Rock crevices are most

numerous within the northern portions of Upper Creek. The rock outcrop within stand 95-36 does not meet the needs of the bat. If the bat utilizes a hollow tree for roosting, Forest Plan standards require two snags or den trees per acre be retained during stand regeneration (page III-23). Dead trees should be >15 inches diameter where they occur and all den trees greater than 22 inches diameter are to be left. These Forest standards would be implemented in both proposed regeneration alternatives. The project design identifies the species priority for residual tree marking to include white oak and hickory, where they occur. These species exhibit bark characteristics utilized by bats and other species for temporary cover. With implementation of project design features, and the greatest amount of preferred rock habitat being located outside the project area, the potential of negative direct impacts to individuals would be greatly reduced (<1%). There are no known indirect effects to the bat or its habitat. The total cumulative effect would be a minimal adverse effect (<1%) on the local population with implementation of either Alternative, including past wildfires occurring outside the hibernating period. Past and present projects of restoring the riparian area along lower portions of Upper Creek and Timbered Branch where dispersed camping have resulted in bare soil would increase the bat's utilization of this riparian community. The majority of the area's fire history has been during the hibernating period of this species, with low intensity fires occurring; resulting in limited suitable snags and den trees being lost. As a result, the cumulative effect within the AA on this bat would be minimal and would not affect the specie's population viability across the Nantahala and Pisgah National Forests (Forests) and no alternative is likely to cause a trend toward federal listing.

Diana Fritillary

There are several records of occurrence for the Diana Fritillary in the activity area. This species is commonly seen utilizing nectar species found along roadsides, streams, and linear grass/forb areas. Both of these alternatives would improve habitat for these nectar species and the butterfly would flourish within 0-10 age class areas post-harvest, for up to five years on 385 acres. Eggs and larvae are found on violets within a forested setting where rhododendron is numerous, usually within riparian corridors where the forest floor is moist. There are approximately 9,365 acres of suitable fritillary habitat across these AA. If either of theses Alternative were selected, approximately 110 acres or 1% of suitable habitat would be regenerated. There would be an increase in nectar species habitat and availability for the short term (5 years) on 385 acres and over the long term (10 years) of 11.5 acres if Alternative C is selected, and 10.5 acres if Alternative B is selected. The following table summarizes the expected effects to the Diana Fritillary:

Table 3-6: Effects to Diana Fritillary Habitat

Diana Fritillary Habitat	Alterative A (Acres)	Alternative B (Acres)	Alternative C (Acres)
Suitable habitat – cove forests Forest type 8, 9, 41 ,50, 53 & 56	9,365	-110 (~1%)	-110 (~1%)
Short-term habitat improvement	0	+385 (~1%)	+385 (~1%)
Long-term habitat improvement	0	+10.5 (0.1%)	+11.5 (0.1%)

If harvesting is carried out during the egg or larval season, individual eggs or larvae may be eliminated by equipment trampling existing violets. Therefore, either of these Alternatives may impact individuals on about 1% of their total suitable habitat, but would improve nectar species habitat on 385 acres over the short term and 10 acres+ of grass/forb habitat over the long term. Both the beneficial indirect habitat effects (~1%) and the negative direct effects (~1%) would be minimal across the AA. Past and present projects of restoring the riparian area along lower

portions of Upper Creek and Timbered Branch where dispersed camping has resulted in bare soil would benefit growth of violets and the fritillary's utilization of this riparian community. Historic fire, although generally outside the growing season, may have destroyed eggs laid on dead or dying violets. The fires generally occurred outside of riparian areas and at an annual average rate of about 165 acres. Since direct effects would be minimal to this species; cumulative effects for either of these alternatives would be minimal and would not likely cause a trend toward federal listing or a loss of population viability locally or across the Forests.

Forest Concern Wildlife Species

The Allegheny woodrat is known within Caldwell County. Nest sites in and around boulder clusters and rock outcrops have been determined to be the only limiting factor for woodrat species utilizing habitat. No nest sites were found during surveys; however, not all outcrops in the AA were surveyed. Recent research (Latchford 1998) has demonstrated that rock or boulder clusters up to ½ acre in size provide suitable nesting habitat and the rock outcrop within stand 95-36 is not suitable nesting habitat because it is too small. This stand is proposed for harvesting by skyline logging systems and the rock outcrop is outside proposed cable corridors. Therefore, additional basal area would be left in the vicinity of the rock outcrop. The woodrat is most commonly found in areas of rich, moist forests located within riparian areas of the AAs. Since proposed vegetative management would not occur in them, there would be no direct, indirect, or cumulative effect to this species' population or its habitat by either of these alternatives.

Management Indicator Species

Neither Alternative B nor C would adversely affect wildlife Management Indicator Species (MIS) known to occur in the AA, nor special habitat or communities identified in the AA. A more detailed analysis on MIS is disclosed in Appendix G.

Grass/Forb Openings

The following table displays the grass/forb openings by alternative:

Table 3-7: Percent of Grass/Forb Openings by Alternative

Minimum Forest Plan Level	Alternative A	Alternative B	Alternative C
0.5%	**0.2%**	**0.28%**	**0.29%**

The Forest Plan identifies at least 0.5 percent grass/forb habitat be maintained and desires 3 percent in Management Area 3B (Forest Plan, pages III-23 and III-74). Although Alternative B would slightly improve the existing grass/forb habitat in the analysis area by creating about 10.5 acres of habitat on landings and Alternative C would expand an existing grass/forb opening by about 1 acre in addition to creating the 10.5 acres of habitat on landings; neither alternative would meet minimum Forest Plan standards.

Habitat Connectivity

Neither Alternative B nor C would adversely affect habitat connectivity because contiguous areas of moderate disturbance level, large contiguous forest areas, and riparian areas would remain intact in the AA (Wildlife Analysis, Upper Creek Project Record). Habitat connectivity would be maintained under either alternative.

3.3 Key Issue #3 – Age-class Distribution

Issue Statement: *Age-class distributions within the analysis area are not balanced as desired in the Forest Plan*

Indicator

◊ Acres by age class before and after implementation

3.3.1 Existing Condition

The Upper Creek Project is located within two AAs; Upper Creek AA and Lower Wilson Creek AA. Within the Upper Creek Analysis Area (AA), approximately 75 percent of forested acres are 71 years old or older. Only 1 percent is in the 0-10 year age-class, and 10 percent is in the 11-20 year age-class. Within the Lower Wilson Creek AA, approximately 79 percent of forested acres are 71 years old or older. Only 2 percent is in the 0-10 year age-class, and 8 percent is in the 11-20 year age-class.

In many of the older stands, especially on upland sites, there are abundant dead standing and dead fallen trees, mostly yellow pines and scarlet oaks. The area has suffered through several outbreaks of southern pine beetle (most recently in 2000-2002) and drought (most recently 1998-2002), and many oaks exhibit symptoms of oak decline.

The age-class distribution is very unbalanced for MA 3B where sustainable timber harvest and provision of young forest is emphasized (Forest Plan, page III-71). Mortality losses will continue to increase as stands get older.

Additional analysis on age-class distribution is disclosed in Appendix B, Age-Class Distribution. The following tables display the existing acres by age-class by Management Area and by AA:

Table 3-8: Forest Plan Allowed 0-10 Year Age-Class for Upper Creek AA

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	5,541	277	831	130	147	699
2A	3,282	164	328	15	149	313
4A & 4D	528	n/a	53	2	n/a	51
Other	4,024	-	-	-	-	-
Total	**13,375**	**441**	**1,212**	**147**	**296**	**1,063**

Summary: *In Upper Creek, harvest 147 to 699 acres in MA 1B and 3B and harvest 149 to 313 acres in MA 2A and harvest 0 to 51 acres in MAs 4A and 4D.*

Table 3-9: Forest Plan Allowed 0-10 Year Age-Class for Lower Wilson Creek AA 512-W

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	3,618	181	543	188	0	355
2A	870	44	87	0	44	87
4A & 4D	2,413	n/a	241	0	n/a	241
Other	3,291	-	-	-	-	-
Total	**10,192**	**225**	**871**	**188**	**44**	**683**

Summary: *In Lower Wilson Creek, harvest 0 to 355 acres in MA 1B and 3B and harvest 44 to 87 acres in MA 2A and harvest 0 to 241 acres in MAs 4A and 4D.*

3.3.2 Alternative A – No Action

3.3.2.1 Direct and Indirect Effects

Under this alternative, there would be no harvesting and the existing condition of not meeting the Forest Plan for early successional habitat would continue.

3.3.2.2 Cumulative Effects

There would be no adverse cumulative effects of past projects when combined with this alternative because there are no direct or indirect effects (see Table 3-4 above).

3.3.3 Alternatives B & C

3.3.3.1 Direct and Indirect Effects

Under these alternatives, about 385 acres would be harvested using a regeneration silvicultural treatment. Both alternatives would help balance the age-class distribution. The 0-10 year age-class in the project area would be brought up to almost 6.5 percent in 2006, meeting Forest Plan standards. The resulting sum of 0-10 and 11-20 year age-classes would be approximately 18 percent. All stands proposed for harvest are from 74 to 99 years old. This project is the only one scheduled in the area for this ten-year period, and would stay within Forest Plan standards for the desired range of harvest for proper age-class distribution in the future.

The majority of harvest is concentrated in the vicinity of existing roads. This keeps the non-harvested areas away from roads in a more undisturbed state. Such concentration is also more economically efficient.

3.3.3.2 Cumulative Effects

There are no adverse cumulative effects anticipated with this alternative when its direct and indirect effects are combined with past actions (see Table 3.4 above). Cumulatively, past, present, and reasonably foreseeable future events are expected to result in the desired range of age-class distributions at any given time.

Current management direction for the Upper Creek project area is to maintain 5%-15% of MA 1B and 3B in young forest (0 to 10 year age-class) and 5%-10% of MA 2A, 4A, and 4D in young forest. These alternatives would continue the established pattern of management in the area for which prior investments have been made. The proposed project would maintain the general land use as a forested environment in the short and long term.

3.4 Key Issue #4 – Old Growth Habitat

Issue Statement: *The proposed action may affect existing and potential old growth habitat*

Indicators
- ◊ Acres treated by age class
- ◊ Acres of newly designated old growth

The following table displays compartments in the Upper Creek project area that are short of meeting Forest Plan standards for small patch old growth (additional analysis on old growth habitat is disclosed in Appendix C, Old Growth Restoration):

Table 3-10: Small Patch Old Growth Needed by Compartment in Upper Creek Project Area

Compartment	Small Patch Old Growth Acres Needed
89	63
90	79
93	50
95	54
107	50
Total	**296**

3.4.1 Alternative A – No Action

3.4.1.1 Direct, Indirect, & Cumulative Effects

Under this alternative, there would be no harvesting and the existing condition of not meeting Forest Plan standards for designated small patch old growth habitat in the eight compartments would continue. Existing stands would remain intact. Past, present, and reasonably foreseeable actions would not have adverse cumulative effects when combined with this alternative.

3.4.2 Alternative B

3.4.2.1 Direct, Indirect Effects

No designated old growth (as per the Forest Plan) would be harvested under this alternative. There may be individual trees greater than 90 years of age harvested under this alternative, but old growth is a community and not an individual tree. Designating about 296 acres of small patch old growth under this alternative along with the existing large patch old growth would ensure old growth habitat is distributed throughout the project area. The following table summarizes age-class reductions for the two AAs by alternative along with old growth disclosures:

Table 3-11: Age-Class for Compartment 401 by Alternative and Old Growth Disclosures

Measurement	Alternative A (existing)	Alternative B (remaining)	Alternative C (remaining)
Acres treated by age-class			
Upper Creek AA			
0-10 years old	1.1%	3.5%	3.5%
11-20 years old	9.6%	9.6%	9.6%
21-30 years old	4.4%	4.4%	4.4%
31-40 years old	2.7%	2.7%	2.7%
41-50 years old	1.0%	1.0%	1.0%
51-60 years old	0%	0%	0%
61-70 years old	6.5%	6.5%	6.5%
71-80 years old	30.8%	30.5%	30.5%
81-90 years old	29.5%	28.6%	28.6%
91-100 years old	11.0%	9.8%	9.8%
101+ years old	3.4%	3.4%	3.4%
Lower Wilson Creek			
0-10 years old	1.8%	2.4%	2.4%
11-20 years old	8.3%	8.3%	8.3%
21-30 years old	2.5%	2.5%	2.5%
31-40 years old	2.8%	2.8%	2.8%
41-50 years old	1.0%	1.0%	1.0%
51-60 years old	0.6%	0.6%	0.6%

Measurement	Alternative A (existing)	Alternative B (remaining)	Alternative C (remaining)
61-70 years old	3.7%	3.7%	3.7%
71-80 years old	22.7%	22.7%	22.7%
81-90 years old	36.5%	35.9%	35.9%
91-100 years old	15.6%	15.6%	15.6%
101+ years old	4.5%	4.5%	4.5%
Acres of existing Forest Plan designated old growth proposed for harvest	0	0	0
Acres of newly designated old growth	0	296	771 (est.)

3.4.2.2 Cumulative Effects

Under this alternative both AAs would Forest Plan standards for small patch old growth. As a result, there would be no adverse cumulative effect anticipated with this alternative when its direct and indirect effects are combined with the past actions displayed in Table 3-4 above.

3.4.3 Alternative C

3.4.3.1 Direct, Indirect Effects

No designated old growth (as per the Forest Plan) would be harvested under this alternative. There may be individual trees greater than 90 years of age harvested under this alternative, but old growth is a community and not an individual tree. Designating about 296 acres of small patch old growth and 475 acres of medium patch old growth near Horsepen Creek under this alternative, along with the existing large patch old growth would ensure old growth habitat is distributed throughout the project area (see Table 3-11 above).

3.4.3.2 Cumulative Effects

Under this alternative both AAs would Forest Plan standards for small patch old growth. As a result, there would be no adverse cumulative effect anticipated with this alternative when its direct and indirect effects are combined with the past actions displayed in Table 3-4 above.

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CHAPTER 4 – PREPARERS AND PUBLIC INVOLVEMENT

The following individuals helped develop this environmental assessment:

4.1 ID Team Members

4.1.1 Core IDT

Scott Ashcraft - Archaeologist: B.S. Archaeology, 12 years USFS experience
Beth Buchanan - Fire Ecologist: M.S. Ecology, 3 years USFS experience
Eric Crews - Landscape Architect: B.L.A., 13 years USFS experience
David Danley - Botanist: B.S. Plant Pathology & Botany, 16 years USFS experience
Sandy Florence - Wildlife Biologist: B.S. Biology, 20 years USFS experience
Michael Hutchins - IDT Leader: B.S. Forest Management, 17 years USFS experience
Lorie Stroup - Fisheries Biologist: B.S. Natural Resources, 8 years USFS experience
Greg Van Orsow - Project Leader: B.S. Forest Management, 4 years USFS experience

4.1.2 Other Forest Service Personnel Providing Input

John Blanton – Silviculturist, NFs North Carolina
Miera Crawford – Grandfather District Ranger
Gary Greer – Fire Management Officer, Grandfather RD
Dean Karlovich – Resource Assistant, Grandfather RD
Ronnie Thomas – Forest Technician, Grandfather RD

4.2 Federal, State, and Local Agencies Providing Input

Brian Cole – USDI Fish and Wildlife Service
Ron Linville – North Carolina Wildlife Resources Commission
Sarah McRae – NC Department of Natural Resources

4.3 Others Providing Input

Bob Gale, Western North Carolina Alliance
Steve Henson, Southern Appalachian Multiple-use Council
Rob Messick
Bridget Nelson, Southern Appalachian Biodiversity Project

APPENDIX A – BIOLOGICAL EVALUATION

APPENDIX A – BIOLOGICAL EVALUATION

UPPER CREEK TIMBER SALE

Avery, Burke, and Caldwell Counties, North Carolina
Grandfather Ranger District

Summary of Effects to TES

There will be no adverse direct, indirect, or cumulative effects to any Threatened & Endangered (T&E) plant, aquatic, or wildlife species populations or their habitat by any alternative considered as no T&E aquatic, botanical, or wildlife species are know to occur in the Upper Creek and Lower Wilson Creek analysis areas analysis area (AA). Consultation with USDI Fish and Wildlife Service is not required.

The Eastern small-footed bat, *Myotis lebii,* is a Regional Forester's sensitive (S) species. With implementation of project design features, and the greatest amount of preferred rock habitat being located outside the project area, the potential of negative direct impacts to individuals would be greatly reduced (<1%). There are no known indirect effects to the bat or its habitat. The total cumulative effect would be a minimal adverse effect (<1%) on the local population with implementation of either Alternative B or C, including past wildfires occurring outside the hibernating period. There would be no adverse effects by selecting Alternative A, outside potential impacts of growing season wildfires. Therefore, under Alternative A, direct or indirect effects to the local eastern small-footed bat population would be minimal (<1%). Past and present projects of restoring the riparian area along lower portions of Upper Creek and Timbered Branch where dispersed camping has resulted in bare soil would benefit the bat's utilization of this riparian community. The majority of the area's fire history was during the hibernating period of this species, with low intensity fires occurring; resulting in limited suitable snags and den trees being lost. As a result, the cumulative effect within these AAs on this bat would be minimal and would not affect the specie's population viability across the Nantahala and Pisgah National Forests (Forests) and no alternative is likely to cause a trend toward federal listing.

The Regional Forester's S species, Diana Fritillary, *Speyeria diana*, is known to occur within the activity areas. Alternative B or C may impact individuals on about 1% of their total suitable habitat but would improve nectar species habitat on 385 acres over the short term and 10 acres+ of grass/forb habitat over the long term. Both the beneficial indirect habitat effects (~4%) and the negative direct effects (~1%) would be minimal across the analysis areas. Past and present projects of restoring the riparian area along lower portions of Upper Creek and Timbered Branch where dispersed camping has resulted in bare soil would benefit growth of violets and the fritillary's utilization of this riparian community. Historic fire, although generally outside the growing season, may have destroyed eggs laid on dead or dying violets. The fires generally occurred outside of riparian areas and at an annual average rate of about 165 acres. Since direct effects would be minimal to this species; cumulative effects for all alternatives would be minimal and are not likely to cause a trend toward federal listing or a loss of population viability locally or across the Forests.

This proposal may affect the Regional Forester's S species *Tsuga caroliniana.* On a Forest-wide scale, this proposal would have very little effect on *Tsuga caroliniana*. There are so many individuals known distributed over such a wide area across the Forest, that the species is not monitored in any quantified manner. Therefore, this proposal would have little effect on the total numbers of *Tsuga caroliniana* individuals throughout the Forest. Proposed activities would directly affect some individuals by all action alternatives, but they would have no quantified or measurable effect upon the Forest viability of *Tsuga caroliniana.* The cumulative effect of proposed activities is immeasurably small and insignificant when compared to local (Upper Creek) or Forest populations. Furthermore, because there is no net loss in *Tsuga caroliniana* habitat, it is expected that any adverse effects would be temporary and would not affect Forest-wide population viability trends.

No risk to aquatic population viability of the following S species is expected: *Ophiogomphus edmundo, Ophiogomphus howei, Alasmidonta varicose,* and *Macromia margarita* would occur as a result of this project.

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Project Location & Description

Location

The 13,332 acre Upper Creek Analysis Area #57 (AA) is comprised of compartments 90-98, 106 and 107. The 10,154 acre Lower Wilson AA #59 is comprised of compartments 62-67, 82, 85-89. The Upper Creek Project is within both AAs, which are approximately 23,486 acres in size and are located in Avery, Burke, and Caldwell Counties. These acres are approximate and were derived from the Continuous Inventory of Stand Conditions (CISC) which sometimes lists slightly different acres than those in Geographic Information System (GIS). This biological evaluation (BE) is a summary of information and analyses from three separate resource reports: the aquatics resource report (AQUA), the botanical resource report (BOTA), and the wildlife resource report (WILDA). These reports are located in the project record for the Upper Creek Project.

Management opportunities have been identified through a comparison of existing and desired conditions which could move this landscape toward a desired future condition. The desired future condition for a given resource was determined by examination of the Land and Resource Management Plan, Amendment 5, for the Nantahala and Pisgah National Forests (USDA March 1994 and here after referred to as the Forest Plan). The purpose and need (objectives) for the proposed actions would be met through harvesting and related activities and meet Forest Plan direction and standards for vegetation management, wildlife management, and visual resources and provide a more sustainable, healthy ecosystem. There are three alternatives in the Upper Creek proposal, Alternative A, B, and C. A detailed description of the proposed actions and alternatives may be found in Chapter 2 of this environmental assessment (EA).

The botanical and aquatic analyses considered those compartments where active management is being proposed; compartments 87, 89-98, and 107. The wildlife analysis considered both AAs.

Proposed Action

- Harvest about 385 acres using the two-age regeneration harvest prescription;
- Designate about 296 acres of small patch old growth by compartment;
- Use and maintain the existing road system;
- Site prepare and subsequently release, if needed, in all stands being regenerated using herbicides and manual methods;
- Prescribe burn approximately 350 acres within Compartment 90;
- Use herbicides to control a total of about one acre or less of invasive exotic (non-native) plants along roads;
- Plant individuals or groups of persimmons and/or native crabapple trees in log landings;
- Create one vernal pond off the Little Chestnut Mountain Road following harvest activities; and
- Anchor large woody debris into about one mile of streambank along Timbered Branch Creek.

Existing Condition

Wildlife

Bird patch #37 was identified in the Forest Plan within these watersheds; however, this patch is outside of the vegetative manipulation proposed. The Craig Creek Watershed proposal is within this bird patch and may require cutting of a few trees to accommodate the equipment needed to re-locate the stream back into its original stream channel.

The Southern Appalachian Assessment or SAA (1996) summary reported that the Southern Appalachian region is 70% forested with the remainder of the area being agricultural and various forms of development. The private land ownership in the region amounts to approximately 84% with NFS lands the next largest acreage at 12%. The majority of private ownership consists of individuals with approximately 15% in commercial ownership. The SAA found that 19% of the land ownership was for the benefit of timber production; therefore the majority of forested land would not be harvested. This region was broken down by forest age class and found that 70% of the forested area was in mid-to-late successional condition. Early successional habitat was found to have decreased on NFS lands. Potential black bear habitat was found to occur on approximately 21 million acres in the Southern Appalachians while ruffed grouse and other early successional habitat dependent species populations have declined due in part to reductions in suitable sapling/pole timber habitat. Since 1970, the assessment concluded that grouse populations and habitat quality across the region was expected to decrease through the next ten years if current land management continues. The majority of low elevation sapling/pole timber was in private ownership whereas 25% of the high elevation early successional habitat was found on forest service lands. An assessment of fragmentation over this region completed by the Forest Service found the Nantahala and Pisgah National Forests were in a fully forested condition (>90%), and unfragmented. Partners in Flight (PiF), North Carolina coordinator, Mark Johns, has stated there is a concern among many in the national PIF organization that the early successional habitat is becoming too fragmented. The proposed project would not affect the habitat delineation given in the SAA. The following table displays age class information by alternative:

Table A-1. Age Class Representation and Proposed Change by Alternative

Age Class – Habitat Vegetation Component	Acres (CISC)	Percentage of AAs	Alt A ac/%chg	Alt B ac/% chg	Alt C ac/%chg
0-10 age – Early Successional	465	2	0[1]	385/+1.6	385/+1.6
11-20 age – Early Successional	2,119	9	-73/-0.3		
21-50 age – Mid Successional	1,605	7			
51-100 age – Mature Forest	18,483	78		385 ac/ -1.6%	385 ac/ -1.6%
101- 140 age – Old Forest	796	4			
Total	23,468	100			
Grass/forb habitat[2]	55.5	0.2		10.5 ac/ +0.4%	11.5 ac/ +0.5%
Open road - mi/sq mi	1.9[3]	2.5[3]			

1 Alternative A – no change in age class across the analysis areas. However in 2005, 73 acres of 20 age class early successional will age out of early successional habitat and in 2006, an additional 119 acres will age beyond the 20 year age class

2 Acres in grass/forb habitat are considered inclusions within a forested stand as they are small, (+/- one acre) areas

3 The Brown Mountain Off Road Vehicle Area (ORV) is within the analysis areas and is a concentrated area of approximately 3,000 acres with 34 miles of motorized trails. Excluding this area and miles of motorized trails, the open road density is 1.9 mi/mi^2

Aquatics

The aquatic resource analysis (AQUA, project record) for the proposed Upper Creek project on the Grandfather Ranger District considered compartments 87, 89, 90, 92, 93, 94, 95, and 107. This area includes three adminstrative watersheds, 57 (Upper Creek), 58 (Parks Creek), and 59 (Wilson Creek). The analysis addresses project area waters and analysis area (AA) waters. Project area waters are defined as those in the area of potential site-specific impacts on aquatic habitat and populations. The AA encompasses waters downstream that potentially could be impacted by project activities, in addition to project area waters.

Table A-2 – Forest Plan Administrative Watersheds 57 (Upper Creek), 58 (Parks Creek), and 59 (Wilson Creek)

Stream Name (UT denotes an unnamed tributary)	Compartment-Stand	Miles in Project Area	Miles in Analysis Area	DEM Classification*
Upper Creek	93, 94, 107	0.8	2.6	WS-III;Tr,ORW
UT 1	94-01	0.11	0.11	WS-III;Tr,ORW
UT 2	107-02	0.4	0.8	WS-III;Tr,ORW
UT 3	107-02	0.2	0.2	WS-III;Tr,ORW
UT 4	107-02	0.2	0.2	WS-III;Tr,ORW
Timbered Branch	95, 87	2.2	2.2	WS-III; Tr; HQW
UT 1	95-08	0	0.4	WS-III; Tr; HQW
UT 2	95-08	0	0.5	WS-III; Tr; HQW
Pearcey Creek	92-05	0.2	0.8	C
UT 1	92-05	0.6	0.8	C
UT 2	92-05	0.4	0.9	C
Carroll Creek	90-05, 90-03	0.4	0.9	C; Tr
UT 1	90-03	0.4	0.4	C; Tr
UT 2	89-01	0.4	1.0	C; Tr
Craig Creek	Watershed project	288 feet	2.5 miles	C; Tr, ORW

*The NC Department of Environmental Management designates classifications and water quality standards known as "Classifications and Water Quality Standards Applicable to the Surface Waters and Wetlands of North Carolina." The "WS-III indicates waters protected as water supplies which are generally in low to moderately developed watersheds and suitable for all class "C" uses. The "C" classification denotes waters suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. "ORW," or outstanding resource waters, indicates waters of unique and special waters of exceptional state or national recreational ecological significance which require special protection to maintain.

Botanical

The botanical analysis area used for this proposal is defined as: compartments: 87, 89, 90, 92, 93, 94, 95, 96, 97, 98, and 107 of the Grandfather Ranger District, Burke and Caldwell Counties, North Carolina.

The Upper Creek botanical AA can be characterized by low elevation Mountain region bordering Piedmont. The AA has several southeast drainages throughout it. The major streams are: Upper Creek, Timbered Branch, Carroll Creek, Parks Creek, and a small portion of Wilson Creek. A succession of southeast trending, interlinking ridges is found between drains. The highest points of these ridges are about 3,200 feet on the north (Chestnut Mountain, Little Chestnut Mountain, Winding Stair Knob, etc.) and east (Ripshin Ridge at 2,870 feet). Brown Mountain (2,900 feet) is in about the center of the analysis area. The drainage flows downward to about 1,200 feet to

the south. The analysis area exhibits many typical plant communities of the low-to-mid elevation southern Appalachian mountains.
A few common community types are characteristic within the AA and include: 1) Pine-oak Heath Forest, 2) Chestnut Oak Forest, and 3) Acidic Cove Forest. The Montane Oak-Hickory Forest occurs to a much lesser extent. A Montane Alluvial Forest, and Rocky Shore and Bar communities are associated with the low elevation areas directly adjacent to major streams, but are best developed along Upper Creek and Timbered Branch. Small habitat areas such as small rock outcrops (particularly in Brown Mountain) and forested seeps and streams can be imbedded within these communities. Natural communities often grade together and definite boundaries are usually difficult to see. However, there is often a pattern to these comminutes on the landscape. Within the AA, the Acidic Cove Forest type often occupies areas near streams, lower cove slopes, and northern aspects. Higher cove slopes, south, and western slopes are often dominated by the Chestnut Oak Forest. Pine Oak Heath Community is found on dryer ridges and slopes. The Montane Oak-Hickory Forest, Montane Alluvial Forest, and anthropogenic communities have the most diverse herbaceous component of the communities found within the analysis area. However, taken in whole, the AA has a very poor herbaceous diversity. All of the communities are very common community types and have a relatively low probability of occurrences for T&E, S, and FC plant species (see Schafale and Weakley for a detailed description and discussion of these communities)—making a generally low potential for plant TESspecies to occur in the potential activity areas. The primary natural communities affected by this proposal are the Chestnut Oak Forest, Acidic Cove Forest, and the Pine-oak Heath Forest.

Cumulative Effects to TES Species & Habitat

Wildlife
Within five years, the increase in soft mast production will somewhat offset any loss of hard mast production through the regeneration harvest proposed, resulting in a slight recovery. With the marking guidelines retaining hard mast species where they exist, the loss of hard mast production from the regeneration activity would be minimal. No changes to the integrity of Bird patch #37 are proposed and the Craig Creek Watershed project would benefit resource conditions within this bird patch.

The proposed Craig Creek Watershed project involves returning the creek to its original location. The project to delineate the dispersed campsites along Timbered Branch Creek and the intersection of Forest Service Roads (FSR) 197 and 286 is on-going. This project has resulted in less bare soil and vehicle traffic within the areas immediately adjacent to the creeks. The campsites being delineated and hardened, along with the toilet facility are outside of the immediate riparian corridor of Upper Creek. These recreation and soil and water resource projects will benefit wildlife species within the analysis area by maintaining wildlife access to water sources and the integrity of the riparian areas. Hunter et. al. (1999) concluded that most riparian areas were cleared decades ago for farmland, residential areas, businesses, and roads. Approximately 65,000 acres of riparian habitat is currently present within the Southern Blue Ridge region, with over 90% occurring at low elevations on private lands (Hunter et. al. 1999).

There have been approximately 3,500 acres of wildfires within these analysis areas since 1981 and approximately 300 acres of prescribed fire. This fire history has resulted in an average of

about 165 acres per year being burned. Where these fires occurred, the shrub layer has been reduced and scattered tree mortality occurred. Wildfires and prescribe burns rarely enter riparian areas where they exhibit cool, low intensity flame heights within this moist environment.

The southern pine beetle (SPB) epidemic within the past five years has resulted in large clumps and scattered yellow pine species mortality, especially along ridge tops on the south end of the Upper Creek AA. Natural regeneration is occurring, and a prescribed burn is planned in the vicinity to reduce the dead and down debris which may be interfering with regeneration to a fully stocked condition.

Aquatics

It is very unlikely that, given the location and types of management proposed, any long-term effects on aquatic species or habitat would be measurable, and therefore contribute to cumulative effects. There has been a tremendous amount of resource specialist involvement in the planning and design of this proposal, contributing to the reduction in possible adverse effects.

Past projects and events within the Upper Creek Project AA include private and Forest Service timber projects, including Pearcey Creek (late 1990s), Little Chestnut (mid 1990s), and Timbered Branch (1990s). Other disturbances within the AA include a dam on private lands located on UT 2 Upper Creek (downstream from the project area), the Upper Creek area watershed improvement project, which is scheduled to be completed in 2005, illegal ORV use, and a wildfire in the Chestnut Mountain area that occurred in the late 1990s.

Two tropical storms moved through the project and analysis areas during September during an 8 day period. These storms released up to 14 inches of rain within 48 hours each time. Many streams within the Catawba drainage were heavily impacted by the storm events. Streams within the Upper Creek Project area were affected by the storm events. As observed in other watersheds across the Pisgah National Forest, these large storms (100 year floods or greater) often act as a “restart mechanism” for cumulative effects. Substrates have been cleaned or washed out, creating habitat for aquatic organisms which rely on interstitial space (the space between substrate particles). Interstitial space is especially important for trout species which spawn over clean substrates that allow for oxygen to reach the eggs and juveniles.

The lower part of the AA remains heavily impacted by private land use. On NFS lands, impacts to the watershed include dispersed campsites, roads, illegal ORV use and the Brown Mountain ORV area. The Grandfather Ranger District has several ongoing projects to eliminate impacts to aquatic resources in the AA. These include enforcement of illegal ORV use, maintaining FSRs, improving and/or removal of campsites from within riparian areas in the watershed, all of which are improving riparian vegetation, preventing vehicles from entering area streams, and preventing off-site movement of soil. As a result, the expected cumulative effects should not be any greater than the direct and indirect effects disclosed above and there should be no adverse cumulative effects to the analysis area aquatic resources, based on the project’s design features included in this analysis.

Botanical

Past actions have affected individuals of *Tsuga caroliniana*. It is known that timber sales in the area (Sand Mountain, Caldwell County; Steels Creek, Burke County; Maple Sally Caldwell and Avery Counties; and Southern Pine Beetle Control, McDowell, Caldwell and Burke Counties) on the Grandfather Ranger District, have affected individuals of *Tsuga caroliniana*. On a Forest-wide scale, this proposal would have very little effect on *Tsuga caroliniana*. There are so many individuals known distributed over such a wide area across the Forest, that the species is not monitored in any quantified manner. Therefore, this proposal would have little effect on the total numbers of *Tsuga caroliniana* individuals throughout the Forest. Proposed activities would directly affect some individuals by all action alternatives, but they would have no quantified or measurable effect upon the Forest viability of *Tsuga caroliniana.* The cumulative effect of proposed activities is immeasurably small and insignificant when compared to local (Upper Creek) or Forest populations. Furthermore, because there is no net loss in *Tsuga caroliniana* habitat, it is expected that any adverse effects would be temporary and would not affect Forest-wide population viability trends. No other TES plant species are known or expected to occur within the activity areas.

Method of Evaluation and Surveys

Potentially affected T&E (2001), and S (2002) species and habitat were identified from the following sources:

1) Information on TES species and their habitat on the Nantahala and Pisgah National Forests were obtained from the North Carolina Wildlife Resources Commission (NCWRC), U.S. Fish and Wildlife Service (USFWS), and North Carolina Natural Heritage Program (NCNHP) records.
2) Surveys completed for this analysis, past surveys and analysis for projects within or near the analysis areas.
3) Consulting with individuals both in the public and private sector who are knowledgeable of the area and its biota.

This analysis has been prepared based on the best available information at the present time.

Project Surveys

The proposed units were surveyed by David M. Danley, Forest Botanist on June 21, 22, 26, 30, 2004, and July 1, 13, 14, 20, 2004. All proposed units were visited at least once during this time.

Lorie Stroup and Sheryl Bryan, USFS Fisheries Biologists, conducted aquatic habitat and aquatic insect surveys of the proposed aquatic project and analysis areas on July 13, 17, 2004, August 16, 2004, October 26, 2004, and December 8, 2004.

Bird points were conducted on June 7 and 8, 2004, by Dennis Helton, Grandfather Ranger District, and on June 8, 10, and 15, 2004, by Sandy Florence, Grandfather Ranger District Wildlife Biologist. Habitat presence for snail and salamanders was conducted. Mist nets and anabat bat surveys were completed on July 20-22, 2004, by Sandy Florence and Luke Decker,

Forest Technician on the Grandfather Ranger District. Surveys were conducted to determine the habitat present, survey significant habitats, and species presence.

Historical Surveys

Botanical survey information was used from the Timbered Branch Timber Sale (1992) and botanical surveys conducted by Alen Smith in compartments 87, 94, 95 and 96. Other sources of information were: Steels Creek Watershed Analysis (Simon et. al., 2002) and Steels Creek Timber Sale Botanical Report (Danley, 2003).

Existing data for aquatic resources within the aquatic AA is used to the extent it is relevant to the project proposal. This data exists in two forms: 1) general inventory and monitoring of Forest aquatic resources; and 2) data provided by cooperating resource agencies from aquatic resources on or flowing through the Forest. Both of these sources are accurate back to approximately 1980 and are used regularly in project analyses. Data collected prior to 1980 is used sparingly (mostly as a historical reference). Project-specific surveys are conducted to obtain reliable data where none exists.

Timbered Branch, Carroll Creek, and Upper Creek were included in the 1992-1995 Brook Trout Surveys conducted by the USFS and the NCWRC (AQUA, Table 4.3). Timbered Branch was surveyed again in 2004 for the presence of brook trout during the cooperative effort with the NCWRC and Western Carolina University to genetically type all brook trout in North Carolina. The NC Department of Environment and Natural Resource's (NCDENR) Water Quality division monitored fish on a site of Upper Creek in both 1997 and 1999. The NCDENR Water Quality division sampled Upper Creek in the summer of 1997 and spring, summer, and fall of 1999.

Surveys were completed by the resource biologists for the Craig Creek watershed project area for the 2004 project of closing illegal vehicle use around the current location of the water flow. No TES plant, salamander, or snail habitat was found and common butterfly species were found to be utilizing the stream bank vegetation for nectar.

Surveys were completed by resource biologists in 2002 of the prescribe burn area in the Brown Mountain ORV area for a burn that was not carried out, encompassing the majority of the proposed prescribe burn area.

Surveys were completed by Sandy Florence and Dave Danley for the relocation of a trail within the Brown Mountain ORV area in 2000.

Species Evaluation

Species evaluated further may be found in Table A-3. Species not evaluated further are listed in Appendix A, along with the reason for elimination from further consideration.

Wildlife

No known T&E species or their habitat occurs within these AAs. Snail and salamander surveys determined habitat was very poor with the exception of the eastern edge of stand 94-02. Common salamander and snail species were found during surveys; no Sensitive species were

recorded. A new occurrence record was found during bat surveys for S species *Myotis leibii,* not previously recorded in Caldwell County.

Botanical

Of the total of 65 plant TES species known to occur in Burke and Caldwell Counties NC, all but 10 species (Table A-3) were dropped from the list for further consideration and discussion for one of the following reasons: 1) lack of suitable habitat for the species in the project area, 2) the species has a well-known distribution that does not include the project area, or 3) based on field surveys of potential habitat, no habitat was seen in the activity areas. Habitats, community types and ranges of plant TES species are derived from information in *Classification of the Natural plant Communities of North Carolina*, the Natural Heritage Program's List of Rare Plant of North Carolina, or information obtained from other botanist. Based upon habitat information, nine plant TES species could occur in the analysis area, an additional four species are known to occur within the botanical analysis area, and only one S species is known to occur within the activity area (Regional Sensitive species *Tsuga caroliniana*). A list of TES plants that occur in Burke and Caldwell Counties is found in Attachment A. A list of TES plants that potentially could occur in the project or activity areas is listed in Table A-3 and summarizes the list of TES plant species that are: likely to occur[1], known to occur, or potentially could occur[2] in the botanical analysis area. *Tsuga caroliniana* is known to occur in compartment/stand; 89-1, 90-3, 92-5, 95-8, 95-40 and 96-14. *Tsuga caroliniana* is likely to occur in other activity areas.

Aquatic

Of the 31 aquatic species listed as occurring or potentially occurring in Burke and Caldwell Counties, 19 were dropped as a result of a likelihood of occurrence evaluation based on preferred habitat elements and field survey results. Aquatic species in Avery County were not included in this analysis because project activity would occur outside of Avery County drainages. Attachment A in the AQUA summarizes this process.

Due to the amount of suitable habitat available across North Carolina and the Southern Appalachian Mountains, a majority of the members of the sensitive and Forest concern aquatic insect community analyzed for this project have been under sampled across North Carolina and their ranges, and therefore are listed with limited distributions. Habitat descriptions for these species, however, indicate that they may be widespread in Mountain Province waters, with several extending their ranges into the Piedmont Province.

1 The use of “likely to occur” refers to those species that are not documented as occurring in the specified area(s) but are expected to occur there because of documentation of very similar habitat to known populations. For all intents of this document, it should be understood that the species does occur in the specified area until additional documentation of presence/absence is known.

2 In this document, the use of the phases “possibly”, “could occur” or “may occur” mean “possible species occurrence” in the very broadest of senses. Only very general habitat preferences and species distribution are used to determine if a species may or could occur. This does not imply their existence in an area.

Threatened or Endangered Species (06/01) Evaluation

Table A-2. Potential Threatened or Endangered Species (2001)

Species	Type	Natural Community or Habitat	Occurrence
Hexastylis naniflora	Vascular	Acidic Cove Forest	Could occur in analysis area, not known to occur in analysis or activity area.

No aquatic or wildlife T&E species or their habitat occurs within the activity area.

No T&E plant species are known or expected to occur within the activity areas. This does not imply that they absolutely do not occur in the proposed activity or analysis areas. In very broad definitions of habitat, *Hexastylis naniflora* could potentially occur in activity areas. However, because of negative survey results, it is unlikely that non detected plant T & E species occur in the activity areas. Because there are no known populations of these plant species in or near the proposed activity areas, there are no known effects (direct, indirect, or cumulative) to these possible species.

Regional Forester's Sensitive Species (02/02) Evaluation

Table A-3. Regional Forester's Sensitive Species Evaluated (2002)

Species	Type	Natural Community or Habitat	Occurrence
Hexastylis rhombiformis	Vascular Plant	Acidic Cove Forest.	Could occur in analysis area, not known to occur in analysis or activity area.
Helianthus glaucophyllus	Vascular Plant	Anthropogenic, roadsides; Rich Cove Forests	Could occur in analysis area, not known to occur in analysis or activity area.
Juglans cinerea	Vascular Plant	Acidic Cove Forest.	Known occur in analysis area, not known to occur in activity area.
Monotropsis oderata	Vascular Plant	Chestnut Oak Forest	Could occur in analysis area, not known to occur in analysis or activity area.
Shortia galaciffolia var. brevistylis	Vascular Plant	Acidic Cove Forest.	Could occur in analysis area, not known to occur in analysis or activity area.
Tsuga caroliniana	Vascular Plant	Chestnut Oak Forest, Pine Oak-Heath Forest.	Known to occur in activity area (stands 89-1, 90-3, 92-5, 95-8, 95-40, and 96-14)
Ophiogomphus edmundo (Edmund's snaketail)	Dragonfly	Lotic	May occur in analysis area.
Ophiogomphus howei (Pygmy snaketail)	Dragonfly	Lotic	May occur in analysis area.
Alasmidonta varicosa (Brook floater)	Mussel	Lotic- Clean and gravel substrates	Known to occur in Upper Creek

Species	Type	Natural Community or Habitat	Occurrence
Macromia margarita (Mountain River Cruiser)	Dragonfly	Lotic- depositional	May occur in the analysis area.
Myotis leibii, (Eastern small-footed bat)	Mammal	Winter – caves and mines Summer – hollow trees	Known to occur within the analysis area
Speyeria diana (Diana Fritillary)	Butterfly	Forages on nectar species within forest openings, most often near streams. Larval species forage on violet species within or near riparian areas with rhododendron	Known to occur within the activity area

Direct, Indirect, and Cumulative Effects to Sensitive Species

Wildlife

If harvesting is carried out during October through March time frame, the Eastern Small-footed bat, *Myotis leibii,* would be hibernating within caves, most prevalent within the northern portion of the Upper Creek drainage, more than a mile from the proposed activities. During late spring through early fall, this species may be found utilizing hollow trees and rock crevices. Rock crevices are most numerous within the northern portions of Upper Creek. The rock outcrop within stand 95-36 does not meet the needs of the bat. If the bat utilizes a hollow tree for roosting, Forest Plan standards require two snags or den trees per acre be retained during stand regeneration (page III-23). Dead trees should be >15 inches diameter where they occur and all den trees greater than 22 inches diameter are to be left. These Forest standards would be implemented in both proposed regeneration alternatives. The project design specifies the species priority for residual tree marking to include white oak and hickory, where they occur. These species exhibit bark characteristics utilized by bats and other species for temporary cover. With implementation of project design features, and the greatest amount of preferred rock habitat being located outside the project area, the potential of negative direct impacts to individuals would be greatly reduced (<1%). There are no known indirect effects to the bat or its habitat. The total cumulative effect would be a minimal adverse effect (<1%) on the local population with implementation of either Alternative B or C, including past wildfires occurring outside the hibernating period. There would be no adverse effects by selecting Alternative A, outside potential impacts of growing season wildfires. Therefore, under Alternative A, direct or indirect effects to the local eastern small-footed bat population would be minimal (<1%). Past and present projects of restoring the riparian area along lower portions of Upper Creek and Timbered Branch where dispersed camping has resulted in bare soil would benefit the bat's utilization of this riparian community. The majority of the area's fire history was during the hibernating period of this species, with low intensity fires occurring; resulting in limited suitable snags and den trees being lost. As a result, the cumulative effect within these AAs on this bat would be minimal and would not affect the specie's population viability across the Nantahala and Pisgah National Forests (Forests) and no alternative is likely to cause a trend toward federal listing.

There are several records of occurrence for the Diana Fritillary, *Speyeria diana,* in the activity area. This species is commonly seen utilizing nectar species found along roadsides, streams, and linear grass/forb areas. Alternatives B and C would improve habitat for these nectar species and

the butterfly would flourish within 0-10 age class areas post-harvest, for up to five years (385 acres). Eggs and larvae are found on violets within a forested setting where rhododendron is numerous, usually within riparian corridors where the forest floor is moist. There are approximately 9,365 acres of suitable fritillary habitat across these AAs. If Alternative B or C is selected, approximately 110 acres or 1% of suitable habitat would be regenerated. There would be an increase in nectar species habitat and availability for the short term (5 years) on 385 acres and over the long term (10 years) of 11.5 acres if Alternative C is selected and 10.5 acres if Alternative B is selected. The following table summarizes the expected effects to the Diana Fritillary:

Table A-4. Effects to Diana Fritillary Habitat

Diana Fritillary Habitat	Alterative A (Acres)	Alternative B (Acres)	Alternative C (Acres)
Suitable habitat – cove forests Forest type 8, 9, 41 ,50, 53 & 56	9,365	-100 (1%)	-100 (1%)
Short-term habitat improvement	0	+385 (1%)	+385 (1%)
Long-term habitat improvement	0	+10.5 (0.1%)	+11.5 (0.1%)

If harvesting is carried out during the egg or larval season, individual eggs or larvae may be eliminated by equipment trampling existing violets. Therefore, Alternative B or C may impact individuals on about 1% of their total suitable habitat but would improve nectar species habitat on 385 acres over the short term and 10 acres+ of grass/forb habitat over the long term. Both the beneficial indirect habitat effects (~1%) and the negative direct effects (~1%) would be minimal across the analysis areas. Past and present projects of restoring the riparian area along lower portions of Upper Creek and Timbered Branch where dispersed camping has resulted in bare soil would benefit growth of violets and the fritillary's utilization of this riparian community. Historic fire, although generally outside the growing season, may have destroyed eggs laid on dead or dying violets. The fires generally occurred outside of riparian areas and at an annual average rate of about 165 acres. Since direct effects would be minimal to this species; cumulative effects for all alternatives would be minimal and are not likely to cause a trend toward federal listing or a loss of population viability locally or across the Forests.

Botanical

The known local populations of *Tsuga caroliniana* in the analysis area occur mostly along ridges and upper slopes primarily associated with Pine-Oak Heath Community. *Tsuga caroliniana* is not an uncommon component species of xeric plant communities of the Catawba River escarpment (Newell, Danley). Hence, the population of *Tsuga caroliniana* is very large and scattered. *Tsuga caroliniana* is known to occur in proposed activity areas: in stands 89-1, 90-3, 92-5, 95-8, 95-40, and 96-14. Furthermore, any stand with Pine-oak Heath or Chestnut Oak Forest has a good likelihood for *Tsuga caroliniana* to be present. Therefore, the action alternatives might adversely affect individual *Tsuga caroliniana*. There is no qualified data available concerning the effects of logging on *Tsuga caroliniana*. However, judging the recovery of *Tsuga caroliniana* by similar actions (logging), *Tsuga caroliniana* seems to repopulate disturbed sites (positive effect). This is an informal observation reinforced by noticing that *Tsuga caroliniana* often occurs along old skid roads and disturbed ridge tops. Since *Tsuga caroliniana* would have a viable population within the analysis area (in areas that would not be affected by this proposal), and the habitat would be at a lower successional state and would be

restored to its current ecological state, it is logical to assume that recovery of *Tsuga caroliniana* would take place over time. Past actions have affected individuals of *Tsuga caroliniana*. It is known that timber sales in the area (Sand Mountain, Caldwell County; Steels Creek, Burke County; Maple Sally Caldwell and Avery Counties; and Southern Pine Beetle Control, McDowell, Caldwell and Burke Counties) on the Grandfather Ranger District, have affected individuals of *Tsuga caroliniana*. On a Forest-wide scale, this proposal would have very little effect on *Tsuga caroliniana*. There are so many individuals known distributed over such a wide area across the Forest, that the species is not monitored in any quantified manner. Therefore, this proposal would have little effect on the total numbers of *Tsuga caroliniana* individuals throughout the Forest. Proposed activities would directly affect some individuals by all action alternatives, but they would have no quantified or measurable effect upon the Forest viability of *Tsuga caroliniana.* The cumulative effect of proposed activities is immeasurably small and insignificant when compared to local (Upper Creek) or Forest populations. Furthermore, because there is no net loss in *Tsuga caroliniana* habitat, it is expected that any adverse effects would be temporary and would not affect Forest-wide population viability trends.

Aquatic

Sensitive species *Ophiogomphus edmundo, Ophiogomphus howei, Alasmidonta varicosa,* and *Macromia margarita* may occur within the project area. The implementation of this project may impact or stress individuals of *Ophiogomphus edmundo, Ophiogomphus howei* and *Macromia margarita* if they exist within Carroll Creek where the permanent bridge crossing is located or they exist in the man-made channel of Craig Creek. There is no mussel habitat within Carroll Creek or Craig Creek therefore; *Alasmidonta varicosa* will not be affected by the implementation of this project. *Alasmidonta varicosa* are located in Upper Creek, below the project area, however it is not expected that any impacts to Upper Creek would occur as a result of the implementation of either action alternative. None of the aquatic macroinvertebrate sensitive species above were found during field surveys in project area streams, however due to variable life cycles of aquatic insects they have been included in the effects analysis. Since the habitat for these individuals is present within the analysis area, they were included in this report. The habitats for these benthic macroinvertebrate species are common across their range. No risk to aquatic population viability to the S species listed above would occur as a result of this project.

Mitigation Measures and Project Design Features

No Mitigation Measures were determined to be necessary to offset effects of any alternative proposed. The following project design features are recommended to reduce potential adverse effects:

- To reduce the possible effect of invasive exotic plant species to this proposal, all known populations of *Miscanthus sinensis*, *Paulownia tomentosa,* and *Ailanthus altissima* should be controlled prior to disturbance activities. *Miscanthus sinensis* was found along Forest Roads. All populations total less than 1 acre. Control of *Miscanthus sinensis, Paulownia tomentosa* and *Ailanthus altissima* is best done by the use of herbicide (Glyphosphate).
- It is recommended that native plants be utilized in wildlife improvement and roadside erosion control.
- Hemlock four inches to eight inches in diameter not affected by the hemlock wooly adelgid within stands 93-02, 94-02, and 94-01, would be retained during harvest and stand

improvement activities to maintain winter roost habitat for many bird species, including ruffed grouse.

- During timber stand improvement, soft mast species of holly, black gum, and dogwood would be maintained to ensure continued production of food utilized by numerous bird species and mammals.
- Species priority for residual tree designation would be; white oak, red oak, and hickory, where present within harvest stands.

Determination of Effects

There will be no adverse direct, indirect, or cumulative effects to any Threatened & Endangered (T&E) plant, aquatic, or wildlife species populations or their habitat by any alternative considered as no T&E aquatic, botanical, or wildlife species are know to occur in the analysis area (AA). Consultation with USDI Fish and Wildlife Service is not required.

List of Preparers

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APPENDIX B – AGE CLASS DISTRIBUTION

APPENDIX B – AGE-CLASS DISTRIBUTION

Forest vegetation within the Upper Creek project area consists mostly of upland hardwood species such as oaks, hickories, red maple, black gum, and black locust. White pine, pitch pine, shortleaf pine, table mountain pine, and Virginia pine occur in varying degrees throughout the area. Drainages are occupied mainly by yellow-poplar, white pine, and hemlock. Understory vegetation includes rhododendron, mountain laurel, and various other shrubs and herbs. By far, most overstory oaks are chestnut oak or scarlet oak.

Within the Upper Creek Analysis Area (AA), approximately 75 percent of forested acres are 71 years old or older. Only 1 percent is in the 0-10 year age-class, and 10 percent is in the 11-20 year age-class. Within the Lower Wilson Creek AA, approximately 79 percent of forested acres are 71 years old or older. Only 2 percent is in the 0-10 year age-class, and 8 percent is in the 11-20 year age-class. Within the 8,237 acre project area, approximately 74 percent of forested acres are 71 years old or older. Only 1.5 percent is in the 0-10 year age-class, and 12 percent is in the 11-20 year age-class.

In many of the older stands, especially on upland sites, there are abundant dead standing and dead fallen trees, mostly yellow pines and scarlet oaks. The area has suffered through several outbreaks of southern pine beetle (most recently in 2000-2002) and drought (most recently 1998-2002), and many oaks exhibit symptoms of oak decline.

This age-class distribution is very unbalanced for MA 3B where sustainable timber harvest and provision of young forest is emphasized (Forest Plan, page III-71). Mortality losses will continue to increase as stands get older.

This analysis determines the minimum and maximum harvest levels for the project area according to the Forest Plan. Both action alternatives would help to balance the age-class distribution to a greater degree. Alternatives B and C would result in bringing the 0-10 year age-class in the project area up to almost 6.5 percent in 2006. The resulting sum of 0-10 and 11-20 year age-classes would be approximately 18 percent. All stands proposed for harvest are from 74 to 99 years old.

Forest Plan Direction for Distribution of Early Successional Habitat

The Forest Plan contains specific desired conditions for the amount of 0-10 year age-class in management areas with timber production (Forest Plan, pages III, 29-31). Regulation is at three scales: the watershed or topographic level; the management area within the watershed or topographic area; and the compartments within the area. The following tables summarize the existing 0-10 year age-class and regeneration goals for these areas and for the Upper Creek project compartments within each analysis area. Uncut inclusions and non-forested areas are not considered as 0-10 year old regeneration.

Upper Creek Compartments 87, 89, 90, 92, 93, 94, 95, 107

For every analysis area with at least 250 acres in MAs 1B, 2A, 3B, 4A and/or 4D, the number of acres in each management area is multiplied by the maximum percent allowed and then summed to determine the amount of 0-10 year age-class allowed in the analysis area, or 1,212 acres in Upper Creek and 871 in Lower Wilson Creek.

For every management area with at least 250 acres in the analysis area, the amount of 0-10 year age-class allowed in the management area is calculated by multiplying the number of acres in each management area in the analysis area by the maximum percent allowed. Each result is the amount of 0-10 year age-class allowed in that management area. In Upper Creek there is a maximum of 831 acres allowed in MAs 1B and 3B, 328 acres in MA 2A, and 53 acres in MAs 4A and 4D. In Lower Wilson Creek there is a maximum of 543 acres allowed in MAs 1B and 3B, 87 acres in MA 2A, and 241 acres in MAs 4A and 4D.

Table B-1: Forest Plan Allowed 0-10 Year Age-Class for Upper Creek AA

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	5,541	277	831	130	147	699
2A	3,282	164	328	15	149	313
4A & 4D	528	n/a	53	2	n/a	51
Other	4,024	-	-	-	-	-
Total	**13,375**	**441**	**1,212**	**147**	**296**	**1,063**

Summary: *In Upper Creek, harvest 147 to 699 acres in MA 1B and 3B and harvest 149 to 313 acres in MA 2A and harvest 0 to 51 acres in MAs 4A and 4D.*

Table B-2: Forest Plan Allowed 0-10 Year Age-Class for Lower Wilson Creek AA 512-W

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	3,618	181	543	188	0	355
2A	870	44	87	0	44	87
4A & 4D	2,413	n/a	241	0	n/a	241
Other	3,291	-	-	-	-	-
Total	**10,192**	**225**	**871**	**188**	**44**	**683**

Summary: *In Lower Wilson Creek, harvest 0 to 355 acres in MA 1B and 3B and harvest 44 to 87 acres in MA 2A and harvest 0 to 241 acres in MAs 4A and 4D.*

For every compartment with at least 250 acres in MA 1B, 2A, 3B, 4A, and/or 4D, the amount of 0-10 year age-class allowed in each compartment is calculated by determining which of the MA's has the most acres in the compartment (1B, 3B, 2A, 4A, or 4D). If 1B and 3B have the most, then the maximum allowed in the 0-10 year age-class is 15 percent of all acres in the compartment. If MA 2A, 4A, or 4D have the most acres, then the maximum amount allowed in the 0–10 year age-class is 10 percent of all acres in the compartment. The following tables display the age-class by compartment and Forest Plan standards (harvest goals):

Table B-3: Lower Wilson Creek AA, Compartment 87, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	246	32	95	30	2	65
2A	40					
4A & 4D	0					
Other	350					
Total	**636**	**32**	**95**	**30**	**2**	**65**

Summary: *In Compartment 87, harvest 2 to 65 acres in MAs 1A, 2A, 3B, 4A and 4D*

Table B-4: Lower Wilson Creek AA, Compartment 89, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	587	63	188	0	63	188
2A	552					
4A & 4D	0					
Other	115					
Total	**1,254**	**63**	**188**	**0**	**63**	**188**

Summary: *In Compartment 89, harvest 29 to 188 acres in MAs 1A, 2A, 3B, 4A and 4D*

Table B-5: Upper Creek AA, Compartment 90, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	393					
2A	1057	79	158	22	57	136
4A & 4D	0					
Other	126					
Total	**1,576**	**79**	**158**	**22**	**57**	**136**

Summary: *In Compartment 90, harvest 57 to 136 acres in MAs 1A, 2A, 3B, 4A and 4D*

Table B-6: Upper Creek AA, Compartment 92, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	884	63	188	0	63	188
2A	128					
4A & 4D	0					
Other	238					
Total	**1,250**	**63**	**188**	**0**	**63**	**188**

Summary: *In Compartment 92, harvest 63 to 188 acres in MAs 1A, 2A, 3B, 4A and 4D*

Table B-7: Upper Creek AA, Compartment 93, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	128					
2A	513	33	66	0	33	66
4A & 4D	0					
Other	17					
Total	**658**	**33**	**66**	**0**	**33**	**66**

Summary: *In Compartment 93, harvest 33 to 66 acres in MAs 1A, 2A, 3B, 4A and 4D*

Table B-8: Upper Creek AA, Compartment 94, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	354					

2A	857	65	129	0	65	129
4A & 4D	0					
Other	80					
Total	**1,291**	**65**	**129**	**0**	**65**	**129**

Summary: *In Compartment 94, harvest 65 to 129 acres in MAs 1A, 2A, 3B, 4A and 4D*

Table B-9: Upper Creek AA, Compartment 95, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	643	54	161	75	0	86
2A	233					
4A & 4D	0					
Other	198					
Total	**1,074**	**54**	**161**	**75**	**0**	**86**

Summary: *In Compartment 95, harvest 0 to 86 acres in MAs 1A, 2A, 3B, 4A and 4D*

Table B-10: Upper Creek AA, Compartment 107, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	384	25	75	0	25	75
2A	0					
4A & 4D	0					
Other	114					
Total	**498**	**25**	**75**	**0**	**25**	**75**

Summary: *In Compartment 107, harvest 25 to 75 acres in MAs 1A, 2A, 3B, 4A and 4D*

APPENDIX C – OLD GROWTH ANALYSIS

APPENDIX C – OLD GROWTH ANALYSIS

Forest Plan Direction for Old Growth

The Forest Plan contains specific directions for designating large, medium, and small old growth restoration patches (Forest Plan, pages III 26-28). The administrative watersheds affected by this project are 57 (Upper Creek), 58 (Parks Creek) and 59 (Wilson Creek). The requirements for this project are as follows: (1) utilize large patch 29; (2) select small patches, if needed, for Compartments 87, 89, 90, 92, 93, 94, 95, and 107; and (3) field check stands in the initial inventory of old growth that would be directly affected by this project.

The purpose of the **large patches** is to serve as permanent reservoirs of biological diversity and to provide preferred habitats for forest interior birds across the landscape.

Large Patch 29: 7,223 contiguous acres, to include 2,186 acres in the Upper Creek watershed and 5,037 acres in the Wilson Creek watershed. Distribution of old growth types are shown below:

Table C-1: Distribution of Old Growth Types

OG Code	OG Type	Acres	% of Patch
2	Hemlock-northern hardwoods	528	7
5	Mixed mesophytic forest	2,962	41
21	Dry-mesic oak forest	1,648	23
22	Dry & xeric oak forest	726	10
24	Xeric pine & pine-oak forest	186	3
25	Dry & dry-mesic oak-pine forest	935	13
35	Mixed mesophytic forest	238	3
Total		**7,223**	**100%**

The purpose of the **medium patches** is to serve as permanent reservoirs of biological diversity. Alternative C would designate the following areas (an estimated 475 acres) as medium patch (near Horsepen Creek) in compartments 86, 87, and 88.

Table C-2: Medium Old Growth Patch in the Lower Wilson Creek Watershed

Comp.	Stand No.	Est. Acres	CISC Age in 2005	Initial Inv.?	Community Type
86	34	36	75	No	Oak/Hickory Forest
87	1	76	92	No	Oak/Hickory Forest
	2	25	79	No	Cove Forest
	3	23	79	No	Oak/Hickory Forest
	4	23	94	No	Oak/Hickory Forest
	5	11	154	No	Oak/Hickory Forest
	6	20	154	No	Oak/Hickory Forest
	7	21	79	No	Oak/Hickory Forest
	10	11	99	No	Oak/Hickory Forest
	16	20	18	No	Oak/Hickory Forest
	17	35	74	No	Cove Forest
	19	10	92	No	Oak/Hickory Forest
	20	25	79	No	Oak/Hickory Forest
	21	34	84	No	Oak/Hickory Forest
	23	5	79	No	Cove Forest

Comp.	Stand No.	Est. Acres	CISC Age in 2005	Initial Inv.?	Community Type
	24	21	92	No	Oak/Hickory Forest
	25	8	79	No	Oak/Hickory Forest
	26	17	74	No	White Pine Forest
	27	8	74	No	Oak/Hickory Forest
	28	13	74	No	White Pine Forest
88	1	29	96	No	White Pine Forest

The purpose of the **small patches** is to increase biological diversity and to provide structural components of old growth at the stand and landscape levels. The following areas would be designated as small patches for long term retention to meet the Forest Plan standard:

Table C-3: Small Old Growth Patches in the Upper Creek and Lower Wilson Creek Watersheds

Comp.[1]	Min. Acres	Stand No.	Est. Acres	CISC Age in 2005	Initial Inv.?	Community Type
89	63	23 (partial)	10	89	No	Pine/Oak Forest
		10 (partial)	53	99	No	Oak Forest
90	79	6	36	67	No	Oak Forest
		7 (partial)	36	32	No	Yellow Pine Forest
		13 (partial)	8	75	No	Yellow Pine Forest
93	50	4 (partial)	33	88	No	Oak/Hickory Forest
		9	17	90	No	Pine/Oak Forest
95	54	17	30	16	No	Pine/Oak Forest
		18	35	87	No	Oak Forest
		33 (partial)	8	69	No	Oak/Hickory Forest
107	50	7	54	81	No	Oak Forest
		15 (partial)	2	87	No	Oak Forest

1 Compartments 87, 92, and 94 already contain small patch old growth and do not need additional small patches to meet Forest Plan standards

Initial Inventory of Old Growth

None of the treatments are proposed in areas included in the initial inventory of old growth, so there will be no impacts to those acres.

Forest Plan Direction for Forest Interior Birds

The Forest Plan contains specific directions for providing preferred habitat conditions for forest interior breeding birds in selected areas (see Forest Plan, page III-32 and Appendix F). Forest Interior Breeding Bird Habitat #37 is adjacent to the Upper Creek project area in compartments 82-86 and 101. Approximately 2,500+ acres of continuous forest canopy is provided there, and would not be affected by this proposal.

APPENDIX D – APPROPRIATENESS OF HARVEST METHODS

APPENDIX D – APPROPRIATENESS OF HARVEST METHODS

Regeneration methods were discussed at length in Appendix E of the FEIS for the Forest Plan, and on pages E-1 and E-2 Forest Plan, Amendment 5. Choices include shelterwood cutting and clearcutting (even-aged management system), two-age (two-aged system), and group selection (uneven-aged system). At this time, single-tree selection (uneven-aged management) is not being considered as appropriate in meeting long-term regeneration needs to sustain productive stands of desirable tree species except in northern hardwood (beech-birch-sugar maple) or hemlock stands (all shade tolerant species). This is because regeneration objectives would not be met and single-tree selection does not work with shade intolerant species as occur in the Upper Creek and Lower Wilson Creek analysis areas. Thinning and sanitation cutting may also occur, but they are intermediate treatments not meant to establish regeneration.

With any method, there must be enough quantity and quality of timber to be removed to make a sale operable, i.e. economically feasible to log at a given stumpage price (stumpage is the price paid for standing timber). The minimum quantity would generally be three thousand board feet of sawtimber per acre, although markets may develop for lower value products. Sawtimber would be defined as trees that are large enough, free enough of defects, and of commercially valuable species which could be sawed into grade 3 or better lumber. Some species like scarlet oak seldom contain any grade 3 logs because of defect. Other species like sourwood seldom reach large enough diameter to become sawtimber. Changes in markets may change operability standards in a local area as well as affecting stumpage price.

Operability and stumpage price are also affected by transportation cost, logging cost, and size of the area being logged. Costs of getting logs from the sale area to the mill are higher for timber in remote areas, where haul roads must be built, or for timber logged with specialized logging equipment, e.g. with cable systems or with a helicopter. As costs increase, prospective timber purchasers lower their bid prices on stumpage to compensate. If the price they can pay becomes less than the minimum acceptable stumpage price, the timber becomes inoperable (no one will buy it).

Each logging crew, depending on the size of their operation and the value of the timber to be logged, would have a minimum amount of timber that would be economical for them to move in and cut. For instance, in a given stand, it might be economical for a given logging crew to harvest a clearcut as small as 10 acres to obtain 50 MBF. If group selection is chosen, where only about 25 percent of the area is regenerated per entry, 40 acres would be needed to provide the crew with the same amount of sawtimber. Therefore, operability becomes an important factor in determining which regeneration methods are appropriate.

Much concern has been expressed over **clearcutting** as a management tool. In compliance with recent direction, other regeneration methods will be used when management objectives can be met and when the other methods are economically feasible. In a memo to Regional Foresters dated June 4, 1992, the Chief of the Forest Service stated that *"Clearcutting would be limited to areas where it is essential to meet forest plan objectives and involve one or more of the following circumstances:*

1. *To establish, enhance, or maintain habitat for threatened, endangered, or sensitive species.*
2. *To enhance wildlife habitat or water yield values, or to provide for recreation, scenic vistas, utility lines, road corridors, facility sites, reservoirs, or similar development.*
3. *To rehabilitate lands adversely impacted by events such as fires, windstorms, or insect or disease infestations.*
4. *To preclude or minimize the occurrence of potentially adverse impacts or insect or disease infestations, windthrow, logging damage, or other factors affecting forest health.*
5. *To provide for the establishment and growth of desired trees or other vegetative species that are shade intolerant.*
6. *To rehabilitate poorly stocked stands due to past management practices or natural events.*
7. *To meet research needs."*

These circumstances will be referred to on a site-specific basis when showing that clearcutting is optimum for a given stand.

Regeneration using the **group selection** method is appropriate where slopes are gentle enough to allow ground skidding of timber (logging costs are relatively low) and where there is enough volume and value in the stands to make selection cutting operable. Group selection is not appropriate in very small stands, on slopes greater than 40 percent where cable logging is required, where timber volume or value is low, or in stands where insect or disease hazards are high and widespread. It is also not appropriate where partial cutting and leaving a white pine seed source would result in conversion of mixed pine/hardwood stands to almost pure pine stands, if the accompanying long-term loss of mast production would be detrimental to local wildlife populations.

The **shelterwood** method of regeneration has been traditionally used where a residual seed source was needed for stand establishment or where new seedlings developed best with partial shade or protection from exposure. In the Appalachian Mountain region, seed from reserve trees (or "leave trees") are usually not needed to establish a new stand, but visual concerns often make shelterwood desirable. Leave trees must be those that would not likely be windthrown after having the adjacent trees cut. The residual overstory of a new shelterwood cut would look more park-like with the biggest and best trees evenly distributed across the landscape, rather than having a denuded appearance like a fresh clearcut might have. Regeneration would become established under the residual overstory. Then, at some later time depending on objectives, all or part of the overstory may be removed so it will not hinder further growth and development of the new stand. Some damage to the regeneration would occur during the overstory removal. Shelterwood is not appropriate on slopes greater than 40 percent where cable logging is required unless timber volume and values are very high. Shelterwood is not appropriate in stands where leaving an overstory would make the stands inoperable, or in stands where insect or disease hazards are high and widespread. It is also not appropriate where partial cutting and leaving a white pine seed source would result in conversion of mixed pine/hardwood stands to almost pure pine stands, if the accompanying long-term loss of mast production would be detrimental to local wildlife populations.

The **two-age** regeneration method is similar to shelterwood except that overstory removal is deferred indefinitely or until another two-age cut can be done. This perpetuates at least two distinct ages of timber growing on the same site. Since leave trees do not have to support another operable sale, they do not have to be merchantable and not as many have to be left.

The type of leave trees retained would depend on site-specific objectives. Basal area of leave trees should not exceed 20-30 sq ft/acre fifteen years after harvest so they will not hinder further growth and development of the new stand. More than one harvest entry may be used to reduce basal area to this level. For example, a shelterwood removal could reduce basal area from 50 sq ft/ac to 15 sq ft/ac, thus perpetuating a two-aged stand. The two-age method is appropriate in operable stands on slopes less than 40 percent whenever there are enough leave trees that will live to be a part of the stand for 50-100 years into the future. Two-age could be appropriate to meet objectives other than timber production, e.g. if continuous acorn production is needed within a stand, or if den trees are scarce, or if aesthetics is a consideration. Two-age would be appropriate on slopes greater than 40 percent if timber value is high enough to offset increased costs of selective logging with cable systems, and if visual concerns or wildlife habitat objectives cannot be met by clearcutting. Two-age is not appropriate in stands where leaving an overstory would make the stands inoperable, or in stands where insect or disease hazards are high and widespread.

The following table describes factors to be considered in determining appropriateness of regeneration methods for each stand:

Table D-1: Factors Considered in Determining Appropriate Regeneration Methods

Compt. - Stand	Est. Acres	Vol./ac (MBF)	1/ Timber Quality	2/ Leave Trees	3/ Future Removal	4/ Access	5/ Special Concerns
87-22	29	8.0	Med-High	Spotty	No	Good	WL
89-01	30	9.0	High	Spotty	No	Good	WL
90-03	39	9.0	High	Spotty	No	Good	WL, Vis
90-05	17	9.0	High	Spotty	No	Good	WL
92-05A	21	8.0	Med-High	Spotty	No	Good	WL
92-05B	40	8.0	Med-High	Spotty	No	Good	WL, Vis
92-05C	27	8.0	Med-High	Spotty	No	Good	WL, Vis
93-02	12	8.0	Med-High	Spotty	No	Good	WL
94-01	16	7.0	Med	Spotty	No	Good	WL
94-02	15	8.0	Med-High	Spotty	No	Good	WL
95-01	4	7.0	Med	Spotty	No	Good	WL
95-08	15	8.0	Med-High	Spotty	No	Good	WL, Vis
95-27	9	8.0	Med-High	Spotty	No	Good	WL
95-36	36	8.0	Med-High	Spotty	No	Good	WL
95-37	4	8.0	Med-High	Spotty	No	Good	WL
95-40	18	7.0	Med	Spotty	No	Good	WL, Vis
107-02	40	5.0	Low	No	No	Good	WL, I/D
107-11	13	8.0	Med-High	Spotty	No	Good	WL

1/ Timber Quality:	Very High	= Northern Red Oak, White Oak, Black Cherry;
	High	= Large White Pine, Yellow-poplar;
	Medium	= Small Diameter Sawtimber, Mixed Oak;
	Low	= Small Roundwood, Scarlet Oak, Yellow Pine.
2/ Leave Trees:	Yes	= Well distributed, long-lived, meet objectives;
	Spotty	= Available in clumps; not well distributed;
	No	= Scarce, scattered, or high mortality risk.
3/ Future Removal:	Yes	= Potential for operable removal of overstory;
	No	= Removal will not be operable within 10 years;
	Cable	= Slopes >40 percent require cable logging systems.

4/ Access:	Good	= Less than 0.5 mile from existing haul road;
	Fair	= 0.5-1.0 mile from existing haul road;
	Poor	= Greater than 1.0 mile from existing haul road.
5/ Special Concerns:	Conversion	= Risk that oak component be lost to pine; (Conv)
	Wildlife	= Modify to provide needs for wildlife; (WL)
	Visual	= Modify to mitigate aesthetic concerns; (Vis)
	Insect/Disease	= High risk of loss due to SPB and/or loss due to oak decline. (I/D)

The following table summarizes appropriate regeneration methods for each stand **and** what is proposed in each alternative:

Table D-2: Appropriate Regeneration Method by Stand by Alternative

					Alt. B	Alt. C	Alt. B	Alt. C	Alt. B	Alt. C	Alt. B	Alt. C
Compt.-Stand	Acres	Forest Type	Age	Method Of Logging	Selection (groups <1 ac)		Shelter-wood BA[1] 30-50		Two-Age BA 20-30		Clearcut w/ Reserve Trees	
87-22	29	Up. Hwd-WP	84	Skidder					Yes	Yes	Yes	Yes
89-01	30	Up. Hwd-WP	89	Skidder					Yes	Yes	Yes	Yes
90-03	39	Up. Hwd-WP	92	Skidder					Yes	Yes	Yes	Yes
90-05	17	Up. Hwd-WP	86	Skidder					Yes	Yes	Yes	Yes
92-05a	21	Up. Hwd-WP	87	Skidder					Yes	Yes	Yes	Yes
92-05b	40	Up. Hwd-WP	87	Skidder					Yes	Yes	Yes	Yes
92-05c	27	Up. Hwd-WP	87	Skidder					Yes	Yes	Yes	Yes
93-02	12	Up. Hwd-WP	89	Skidder					Yes	Yes	Yes	Yes
94-01	16	Up. Hwd-WP	99	Skidder					Yes	Yes	Yes	Yes
94-02	15	Up. Hwd-WP	99	Skidder					Yes	Yes	Yes	Yes
95-01	4	Up. Hwd-WP	89	Cable					Yes	Yes	Yes	Yes
95-08	15	Up. Hwd-WP	74	Cable					Yes	Yes	Yes	Yes
95-27	9	Up. Hwd-WP	87	Skidder					Yes	Yes	Yes	Yes
95-36	36	Up. Hwd	94	Cable					Yes	Yes	Yes	Yes
95-37	4	Up. Hwd	94	Cable					Yes	Yes	Yes	Yes
95-40	18	Up. Hwd-WP	79	Cable					Yes	Yes	Yes	Yes
107-02	40	Up. Hwd-Pine	92	Skidder					Yes			Yes
107-11	13	Up. Hwd-WP	95	Skidder					Yes	Yes	Yes	Yes

1 – Basal Area (BA)

Stands 95-01, 95-08, 95-36, 95-37, and 95-40

Since slopes are steeper than 40 percent in these stands, cable logging systems are needed to limit soil exposure. Topography precludes the use of selection cutting. Timber volume is too low in these stands to allow leaving enough merchantable trees as “overwood” to make a future cable removal cut operable, so shelterwood is not appropriate. There is adequate timber value in the stands to cover the increased cost of leaving and logging around a few leave trees per acre; therefore, two-age harvest would be appropriate. Clearcutting would be appropriate for providing regeneration, but since the same objectives can be met with two-

age, clearcutting is not the optimum method. The added expense of two-age system is warranted by wildlife habitat needs in these stands.

Stand 107-02

This stand contains a component of Virginia pine and/or yellow pine, which is nearing or has reached pathological maturity. Southern pine beetles have infested this and surrounding stands, and have killed many trees (Chief's clearcutting circumstance #4). There are not enough available leave trees for a two-age or a shelterwood cut. Low timber quality and value would cause selection to be inoperable. Establishment of pine regeneration would require control of shade and competition, as Virginia pine and yellow pines are shade intolerant (Chief's circumstance #5). If shortleaf pine is the desired species, prescribed burning prior to planting would be needed (weather conditions permitting). Planting on a 12-foot by 12-foot spacing would be wide enough to allow concurrent development of oaks and other desirable hardwoods. Therefore, clearcut is the optimum and appropriate method of harvest for this stand. Hardwood inclusions, such as moist coves, would not be planted, but would be managed for hardwood regeneration. After 3 to 4 growing seasons, streamline release using herbicides would be used if needed to maintain adequate stocking of oak, pine and other desirable tree species.

Stand 301-11, 302-01 and Portion of 304-04

These stands contain a significant component of yellow pine and/or Virginia pine, which is nearing or has reached maturity. Southern pine beetles have already infested parts of the stands and have killed many trees. Establishment of pine regeneration would require control of shade and competition in a new stand, as Virginia pine and yellow pines are shade intolerant. There would be too much shade and competition in a shelterwood or selection cut to regenerate yellow pine. Clearcutting would be appropriate for providing regeneration, but since the same objectives can be met with two-age, clearcutting is not the optimum method.

All Remaining Stands

Remaining stands are located on relatively gentle slopes and all have good accessibility. However, available leave trees are not well distributed and/or stand sizes are relatively small. The small size and medium timber volume would make a future removal cut inoperable; therefore, shelterwood is not appropriate. The two-age method would be appropriate if small diameter trees are included as leave trees, and if good distribution of leave trees is not critical. In addition, many of these stands contain a significant component of mature scarlet oaks and leaving these trees in a shelterwood or thinning would result in heavy mortality losses due to wind throw, insect infestations, or disease. The added expense of the two-age system is warranted by wildlife habitat needs or aesthetic concerns in these stands.

There are pockets of other tree species, which have the capacity to increase in size and value. Where white pines are left in any partial cut, thick establishment of white pine natural regeneration would occur in openings. Most of the stands contain an overstory white pine component and this would result in a reduction of the hardwood component, which would affect mast production in the long run. Therefore, a two-age cut leaving mostly hardwoods would meet wildlife objectives better than thinning or shelterwood. Clearcutting would be appropriate for providing regeneration, but since the same objectives can be met with two-age, clearcutting is not the optimum method.

Timber Cutting Methods Considered

The following is a list of timber cutting methods which were considered in this analysis. A brief description is provided to help the reader understand these terms as they are used in this document:

Cutting for Even-aged or Two-aged Regeneration

Clearcutting

Removal, in a single cutting, of older trees to establish a new stand of trees in a fully exposed microclimate. All merchantable trees on an area are harvested, and remaining trees are cut or killed in site preparation. This method will be used only when no other method is feasible.

Shelterwood Cutting

Similar to clearcutting, except some overstory trees are temporarily left well distributed across an area to accomplish some objective. Usually 20-40 sq ft/acre of basal area is left. Depending on diameter, this could be between 10 and 50 trees per acre (fewer large trees are required to reach a given basal area). Normally, only healthy, windfirm trees are left as overwood. After a time, usually within 10 years, the overwood is removed by logging or by other means so that it does not impede development of the younger trees that were established after the shelterwood cut.

Two-Age Cutting

Similar to shelterwood cutting except fewer overstory trees are left in place, and they are not subsequently removed, so that two distinct ages of trees are maintained on the same site. Trees left as overwood should be long-lived since they may be expected to live 120 years or more (Beck 1986).

Cutting to Establish Regeneration and Maintain at Least 3 Ages in an Area

Group Selection Cutting

Cutting small areas between 0.2 and 1.0 acre each, distributed over a large area, with the intent over time to establish three or more distinct age-classes. Width of an individual opening would be 1.5 - 2 times the height of trees adjacent to the opening. Small trees having good growth potential may be left standing within openings, and priority for openings would be where mature timber occurs. The number of openings would depend on the size of the area where selection would be used, the frequency of timber sale entry, and the desired age of the oldest trees. Intermediate harvests to improve the condition of the residual stand or to establish advance regeneration may be done between openings when needed.

Cutting to Anticipate Mortality and Improve the Growth and Vigor of the Remaining Trees without Regard for the Establishment of Regeneration

Free Thinning

Cutting trees that are diseased or damaged, suppressed by other trees, or that are crowding other trees. The best trees in terms of species, size or quality are left to grow. Some minimum basal area is usually set using this type of timber stand improvement.

Sanitation Thinning

Cutting trees that have been attacked or appear in imminent danger of attack from injurious agents (such as disease or insects) other than competition between trees. The best trees in terms of species or vigor are left to grow. No minimum basal area is set using this type of timber stand improvement.

Selection Thinning

Cutting the larger trees in an area to improve the growth of the remaining trees, but leaving enough desirable, healthy trees to recapture the potential of the site and develop into larger merchantable trees themselves in a reasonable time. This may be done with yellow-poplar on a good site, but only once during a rotation (Beck 1988).

Other Terms Used

Advance Reproduction

Young trees, usually seedlings and saplings, growing in the understory of existing stands.

Rotation

The time between regeneration and final harvest.

Stand

A community of trees sufficiently uniform in composition, age, site productivity, spatial arrangement, or condition to be distinguishable from adjacent communities, thereby forming a silvicultural or management entity.

APPENDIX E – FINANCIAL EFFICIENCY

APPENDIX E – FINANCIAL EFFICIENCY

Purpose

The purpose of the financial efficiency analysis is to present the estimated costs and revenues of the alternatives considered in the Environmental Analysis for the Proposed Stateline Timber Sale and Associated Activities, Grandfather Ranger District, Pisgah National Forest. Forest Service policy requires a financial efficiency analysis be prepared for timber sale proposals expected to exceed $100,000 in value (Forest Service Manual 2432.12).

Assumptions

For the purpose of this analysis, the following assumptions will apply:

1. Discount Rate is 4%.
2. Inflation rate is 0% throughout the analysis period (60 years plus).
3. Estimated timber revenues were calculated using the base prices from the Pisgah and Nantahala National Forests 1st Quarter Adjustment Sheet for Fiscal Year 2005 issued out of the Forest Supervisor's office in Asheville, North Carolina.
4. Sale preparation costs and timber harvest administration costs were obtained from budget figures for the 2005 National Forests in North Carolina. Sale/contract preparation costs are approximately $9.60/CCF and timber harvest administration costs are approximately $4,000 per year of Sale (generally sale runs 3 years).
5. Analysis, documentation, and resource support costs were based funding given by the Supervisor's office of $40,000 per EA/DN.
6. Reforestation and silvicultural treatment costs were taken from averages of actual contract costs on the Grandfather Ranger District plus an additional 25% to cover district preparation and administration costs.
7. Road construction is now estimated at $90,000/mile and road reconstruction was estimated at $30,000/mile.
8. A 60-year long-term projection was used for comparison basis only. Many of these stands will be carried for a longer rotation period.

Limitations of Analysis

Any financial analysis must draw limitations on the amount of data to be included or the entire process would quickly become a mix of different alternatives and expected yields or losses. For instance, inflation rate is assumed to be 0% over the entire analysis period; a situation rarely encountered in the real world. The differences between the economic values of the alternatives remain the same, regardless of the inflation rate, so constant dollars were used for comparisons between alternatives. The following tables are estimates of total timber sale related costs and may be used to determine timber sale financial efficiency. There are other costs, such as botanical, aquatic, and wildlife enhancements not directly associated with timber sale efficiency that are not included in this analysis.

Financial Analysis Worksheets

Table E-1: Sale Revenue Estimates for all Alternatives

Alternative	Timber Volume (CCF)	Revenues
A	0	$0
B	3,112	$164,275
C	3,185	$164,675

Table E-2: Sale Cost Estimates – Alternative B

Activity	Units	Number	Cost/Unit	Total Costs
Silvicultural Exams	Acres	600	$10.00	$6,000
Analysis, Documentation, Other Resource Support	Each	1	$40,000	$40,000
Sale/Contract Preparation	CCF	3,112	$9.60	$29,875
Sale Administration	Year	3	$4,000	$12,000
Road Engineering and Construction	Miles	0	$90,000	$0
Temp. Road Engineering and Reconstruction	Miles	.25	$60,000	$15,000
Cable Yarding	MBF	615	$35	$21,525
Site Preparation – Herbicide	Acres	385	$75	$28,875
TOTAL				**$153,275**

Table E-3: Benefit Cost Ratio – Alternative B

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	$164,275	$153,275	$11,000	1.07
60	0.04	$6,571	$6,131	$440	1.07

PNV – present net value
BCR - benefit cost ratio

Table E-4: Sale Cost Estimates – Alternative C

Activity	Units	Number	Cost/Unit	Total Costs
Silvicultural Exams	Acres	600	$10.00	$6,000
Analysis, Documentation, Other Resource Support	Each	1	$40,000	$40,000
Sale/Contract Preparation	CCF	3,185	$9.60	$30,575
Sale Administration	Year	3	$4,000	$12,000
Road Engineering and Construction	Miles	0	$90,000	$0
Temp. Road Engineering and Reconstruction	Miles	.25	$60,000	$15,000
Cable Yarding	MBF	615	$35	$21,525
Site Preparation – Herbicide	Acres	385	$75	$28,875
Prescribed Burning	Acres	40	$175	$7,000
Seedling Planting Stock	Thousand	16	$50	$800
Hand Plant Conifers	Acres	40	$75	$3,000
TOTAL				**$163,375**

Table E-5: Benefit Cost Ratio – Alternative C

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	$164,675	$163,375	$1,300	1.01
60	0.04	$6,587	$6,535	$52	1.01

PNV – present net value
BCR - benefit cost ratio

Salability of Upper Creek Timber Sale

Salability is determined by accessibly of timber and current markets for timber. Upper Creek project area is mainly accessible from Forest Service Roads 982, 4101, and 299. Some temporary road construction is necessary to access some units; however road construction costs are estimated to be $15,000, well below the value of the timber to be removed, which is estimated to be as high as $164,675. The overall timber quality is medium-high within the proposed sale units. Market for this quality timber is good within western North Carolina. Recent timber sales sold on the Pisgah National Forest show revenues have been higher than estimated, there are no problems anticipated in selling the Upper Creek project timber sale units when offered.

APPENDIX F – STANDARD MITIGATION FOR PRESCRIBED FIRE & HERBICIDE USE

APPENDIX F – STANDARD MITIGATION MEASURES FOR PRESCRIBED FIRE AND HERBICIDE USE

Prescribed Fire Mitigation Measures

1. Slash burns are done so they do not consume all litter and duff and alter structure and color of mineral soil on more than 20 percent of the area. Steps taken to control soil heating include use of backing fires on steep slopes, scattering slash piles, and burning heavy fuel pockets separately.
2. On severely eroded forest soils, any area with an average litter-duff depth of less than l/2 inch is not burned.
3. Where needed to prevent erosion, water diversions are installed on firelines during their construction, and the firelines are revegetated promptly after the burn.
4. Firelines which expose mineral soil are not located in filter strips along lakes, perennial or intermittent springs and streams, wetlands, or water-source seeps, unless tying into lakes, streams, or wetlands as firebreaks at designated points with minimal soil disturbance. Low-intensity fires with less than 2 foot flame lengths may be allowed to back into the strip along water bodies, as long as they do not kill trees and shrubs that shade the stream. The strip's width is at least 30 feet plus 1.5 times the percent slope (Forest Plan, page III-183).
5. When wetlands need to be protected from fire, firelines are used around them only when the water table is so low that the prescribed fire might otherwise damage wetland vegetation or organic matter. Where practical, previous firelines are reused, and firelines must cause minimal soil disturbance.
6. Smoke management guidelines are used to reduce smoke emissions. When feasible, backing and flanking fires are used instead of heading fires, and burning is done when duff and large fuels are moist and small fuels are dry. Slash piles are not burned unless relatively free of soil. All burns are completed during the active burning period and mopped up as soon as practical after completion (Forest Plan, page III-29).
7. Smoke management guidelines are also used to enhance smoke dispersion. Burning is done when the atmosphere is thermally neutral to slightly unstable, not during pollution alerts, stagnant or humid weather, or inversions (Forest Plan, page III-29).
8. Prescribed fires are conducted under the direct supervision of a burning boss with fire behavior expertise consistent with the project's complexity. All workers must meet health, age, physical, and training requirements in FSM 5140, and use protective clothing and equipment.

Herbicide Application Mitigation Measures

1. Herbicides are applied according to labeling information and the site-specific analysis done for projects. This labeling and analysis are used to choose the herbicide, rate, and application method for the site. They are also used to select measures to protect human and wildlife health, non-target vegetation, water, soil, and threatened, endangered, proposed, and sensitive species. Site conditions may require stricter constraints than those on the label, but labeling standards are never relaxed.
2. Only herbicide formulations (active and inert ingredients) and additives registered by EPA and approved by the Forest Service for use on National Forest System lands are applied.

3. Public safety during such uses as viewing, hiking, berry picking, and fuelwood gathering is a priority concern. Method and timing of application are chosen to achieve project objectives while minimizing effects on non-target vegetation and other environmental elements. Selective treatment is preferred over broadcast treatment.
4. Areas are not prescribed burned for at least 30 days after herbicide treatment.
5. A certified pesticide applicator supervises each Forest Service application crew and trains crew members in personal safety, proper handling and application of herbicides, and proper disposal of empty containers.
6. Each Contracting Officer's Representative (COR), who must ensure compliance on contracted herbicide projects, is a certified pesticide applicator. Contract inspectors are trained in herbicide use, handling, and application.
7. Contractors ensure that their workers use proper protective clothing and safety equipment required by labeling for the herbicide and application method.
8. Notice signs (FSH 7109.11) are clearly posted, with special care taken in areas of anticipated visitor use.
9. Triclopyr is not ground-applied within 60 feet of known occupied gray, Virginia big-eared, or Indiana bat habitat. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
10. No herbicide is ground-applied within 60 feet of any known threatened, endangered, proposed, or sensitive plant. Buffers are clearly marked before treatment so applicators can easily see and avoid them
11. Application equipment, empty herbicide containers, clothes worn during treatment, and skin are not cleaned in open water or wells. Mixing and cleaning water must come from a public water supply and be transported in separate labeled containers.
12. No herbicide is ground-applied within 30 horizontal feet of lakes, wetlands, or perennial or intermittent springs and streams. No herbicide is applied within 100 horizontal feet of any public or domestic water source. Selective treatments (which require added site-specific analysis and use of aquatic-labeled herbicides) may occur within these buffers only to prevent significant environmental damage such as noxious weed infestations. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
13. During transport, herbicides, additives, and application equipment are secured to prevent tipping or excess jarring and are carried in a part of the vehicle totally isolated from people, food, clothing, and livestock feed.
14. Only the amount of herbicide needed for the day's use is brought to the site. At day's end, all leftover herbicide is returned to storage.
15. Herbicide mixing, loading, or cleaning areas in the field are not located within 200 feet of private land, open water or wells, or other sensitive areas
16. During use equipment to store, transport, mix, or apply herbicides is inspected daily for leaks.

APPENDIX G – MANAGEMENT INDICATOR SPECIES

APPENDIX G – MANAGEMENT INDICATOR SPECIES

Introduction

An assessment of habitat changes linked to management indicator species (MIS) is documented in this section. The assessment provides a checkpoint of project level activities, the anticipated change in habitat used by MIS, and the likely contribution to Forest-wide trends. Additional information on MIS, as well as other species, is located in the EA and the wildlife, aquatics, and botanical resource reports.

Process

The Forest-wide list of MIS was considered as it relates to this project analysis area. Only those MIS that occur or have habitat within the project analysis area and may be affected by any of the alternatives were carried through a site-specific analysis. The documentation below shows which MIS were and were not analyzed along with the reasons.

Consistent with the Forest Plan and its associated FEIS (Volumes I and II), the effects analyses focus on changes to MIS habitat. These project-level effects are then put into context with the Forest-wide trends for populations and habitats.

To process and document the information efficiently, a series of tables are used as follows:

1) **Tables G-1** and **G-2:** These tables display the biological communities, special habitats, associated MIS, and reasons species were, or were not selected for analysis in the project. The source of these tables is the Final Supplement to the Final Environmental Impact Statement (FSFEIS), Vol. I, Tables III-8 and III-9.
2) **Tables G-3** and **G-4:** These tables compare the effects (expressed as changes in habitat) by alternative to the Forest-wide estimates of habitats for each biological community and special habitat considered in the project-level analysis. Following these tables is a discussion of the cumulative effects for the selected species and habitats.
3) **Table G-5:** This table displays by MIS the Forest-wide population trend along with the associated biological community or special habitat. The information in this table is taken from the MIS Report for the Nantahala and Pisgah National Forests. This table is used in conjunction with the information presented in Tables MIS 3 and MIS 4 to explain how the project's effects to habitats affect Forest-wide population trends for the species considered.

Table G-1: Biological Communities, Associated MIS (per the Final Supplement to the Final Environmental Impact Statement Volume I, Table III-8), and why Species were Chosen or Eliminated from Analysis

Biological Community	MIS	Analyzed Further/ Evaluation Criteria
Fraser fir forests	Fraser fir, golden-crowned kinglet, Carolina northern flying squirrel	No/1
Red spruce/fraser fir forests	Golden crowned kinglet, Carolina northern flying squirrel, solitary vireo	No/1
Grassy and heath balds	Mountain oat-grass, Catawba rhododendron	No/1
Northern hardwood forests	Carolina northern flying squirrel, twisted stalk, solitary vireo	No/1
Carolina hemlock bluff forests	Golden-crowned kinglet, Carolina hemlock	No/1
Cove forests	Ginseng, black cherry, buckeye, basswood, solitary vireo	No/2

Biological Community	MIS	Analyzed Further/ Evaluation Criteria
Oak and oak/hickory forests	Red oak, white oak, hickories	Yes
White pine forests	White pine (natural community only)	No/1
Yellow pine mid-successional communities	Pine warbler (low elevational shortleaf/Virginia pine)	No/2
Xeric yellow pine forests	Pine warbler (pine/oak/heath low elevation habitats) pitch pine, table mountain pine, turkey beard, mid-successional)	Yes
Reservoirs	Index of biotic integrity, largemouth bass, bluegill	No/1
Forested seep wetlands	Golden saxifrage, umbrella leaf, mountain lettuce	No/1
Bogs	*Sphagnum spp.*	No/1
Mountain ponds and ephemeral pools	Spotted salamander (vernal pools)	No/2
Barrens and glades	Prairie dropseed, slender wheatgrass	No/1
Shaded rock outcrops and cliffs	Green salamander (granitic gneiss rock outcrops with crevices and mesic conditions), Jordan's salamander, alumroots, saxifrages	No/2
Open rock outcrops and cliffs	Raven, peregrine falcon, Biltmore sedge, wretched sedge, mountain oat-grass	No/2
Caves	Bats (all cave-using species)	No/2
Alluvial forests	Two-lined salamander (mid-late successional stages), raccoon (all forest types), mink	No/2
Coldwater streams	Brook, brown, and rainbow trout; sculpin, blacknose dace	No/2
Coolwater streams	Smallmouth bass, white sucker, moxostoma spp., index of biotic integrity	No/2
Warmwater streams	Index of biotic integrity, smallmouth bass, freshwater mussels, spotfin chub	No/2
Invasive exotic plant species	Japanese honeysuckle, Japanese grass, Chinese privet, periwinkle	Yes

1 Biological Community and its represented species are not known to occur within the project area; therefore, this biological community would not be affected by any of the alternatives. Given no effects to the community, the alternatives in this project would not cause changes to Forest-wide trends or changes in population trends of species associated with this community.

2 Biological Community is imbedded in the project area, but would not be affected by management activities because the biological community would not be entered by the proposed activities. Given no effects to the community, the alternatives in this project would not cause changes to Forest-wide trends or changes in population trends of species associated with this community.

Table G-2: Special Habitats, Associated MIS (per Final Supplement to the Final Environmental Impact Statement Volume I, Table III-9), and why Species Chosen or Eliminated from Analysis

Special Habitat	MIS	Analyzed Further/ Evaluation Criteria
Old forest communities (100+ years old)	Black bear (dens, low levels of disturbance), bats (roosting and foraging habitats in mature forests), pileated woodpecker (cavities, foraging habitat), lung lichens	No/2
Early successional (0-10 years old)	White-tailed deer (all communities and elevations), eastern wild turkey (all communities), ruffed grouse (early and mid-successional all communities) rabbits, rufous-sided (eastern) towhee, bobcat, field sparrow (brushy, riparian thickets)	Yes
Early successional (11-20)	Rufous-sided (eastern) towhee, ruffed grouse (early and mid-successional all communities)	Yes
Soft mast-producing	Wild grape (*vitus spp.)*, cedar waxwing (all communities soft	Yes

Special Habitat	MIS	Analyzed Further/ Evaluation Criteria
species	mast)	
Hard mast-producing species (>40 yrs)	Black bear, wild turkey, gray squirrel, white-tailed deer	Yes
Mixed pine/hardwood forest types (successional stage and hard mast)	Black bear, eastern wild turkey, gray squirrel, white-tailed deer	No/2
Permanent grass/forb openings	Eastern wild turkey, eastern meadowlark, rabbit	Yes
Contiguous areas with low disturbance (<1 mile open travelway/4 square miles	Black bear (all communities)	No/1
Contiguous areas with moderate disturbance levels (<1 mile open travelway/2 square miles)	Eastern wild turkey (all communities)	No/2[3]
Den trees (>36" dbh)	Black bear (large dens)	No/2
Snags and dens (>22" dbh)	Pileated woodpecker, raccoon (moderate sized dens)	No/2
Small snags and dens	Gray squirrel, white-breasted nuthatch, yellow-bellied sapsucker (breeding populations)	Yes
Downed woody debris – all sizes (foraging and cover habitats)	Black bear (all communities), pileated woodpecker, ruffed grouse (down logs for drumming), Jordan's salamanders	Yes
Large contiguous forest areas	Ovenbird (in breeding range, moderately productive sites), northern parula warbler (in breeding range, requires cover and riparian habitats) veery, solitary (blue-headed) vireo	No/2

1 Special Habitat and its represented species are not known to occur within the project area; therefore, this special habitat would not be affected by any of the alternatives. Given no effects to the community, the alternatives in this project would not cause changes to Forest-wide trends or changes in population trends of species associated with this habitat.

2 Special Habitat is imbedded in the project area, but would not be affected by management activities because the special habitat would not be entered by the proposed activities. Given no effects to the habitat, the alternatives in this project would not cause changes to Forest-wide trends or changes in population trends of species associated with this habitat.

3 See description of defined AA's within Wild Turkey write-up on page 11 of the wildlife report, project record

Table G-3: Biological Communities, Forest-wide Estimates, and Expected Changes Resulting from the Alternatives[1]

Biological Community	Forest-wide Estimate	Estimated Changes		
		Alternative A	Alternative B	Alternative C
Oak and oak/hickory forests	High El Red oak: 40,600 ac Mesic Oak/H: 283,340 ac Dry Mesic Oak/H: 21,800 ac Chestnut Oak/H: 8,600 ac Upland hwd (other): 6,900 ac	None affected	315 acres harvested	315 acres harvested
Xeric Yellow Pine Forests	Xeric pine dominated: 29,000 ac.	None affected	88 acres harvested, 350 acres burned	88 acres harvested, 350 acres burned
Invasive Exotic Plant Species	2,684 miles of road construction <25 years	No change	0.25 miles of temporary road constructed	0.25 miles of temporary road constructed

[1] See section "Evaluating the Effect of Project-level Activities on Forest-wide Population Trends for MIS" below for additional analysis by alternative and on population trends

Table G-4: Special Habitats, Forest-wide Estimates, and Expected Changes Resulting from the Alternatives[1]

Special Habitat	Forest wide Estimate	Estimated Changes		
		Alternative A	Alternative B	Alternative C
Early successional (0-10 years old)	26,800 ac (yr 2000) 2,040 ac (5 yr avg) downward trend	None affected	Increase 385 acres	Increase 385 acres
Early successional (11-20 years old)	46,290 ac (yr 2000) Peak of upward trend	None affected	Increase 385 acres	Increase 385 acres
Soft mast producing species	13,144 ac early seral (yr 2000), highest potential on 5,650 ac downward trend	No Change	Slight increase in soft mast species habitat	Slight increase in soft mast species habitat
Hard mast producing species (>40 years old)	681,000 acres, increasing trend	No Change	Decrease 121 acres or 1.3% habitat	Decrease 121 acres or 1.3% habitat
Permanent grass-forb openings	3,000 acres	No Change	10.5 ac increase	11.5 acre increase
Small snags and dens	Ave. at 80 year Cove=4/acre Upland=3/acre Pine=2/acre	No Change	Small number lost/damaged during harvest operations on: 385 acres	Small number lost/damaged during harvest operations on: 385 acres
Downed woody debris, all sizes (foraging and cover habitats)	High Accumulation Small wood: 18,000 Large wood: 386,000 Low Accumulation	No Change	Increase Small wood and Large wood on 385 ac high acc. areas	Increase Small wood and Large wood on 385 ac high acc. areas

Special Habitat	Forest wide Estimate	Estimated Changes		
		Alternative A	Alternative B	Alternative C
	(approx: 600,000)			

[1] See section "Evaluating the Effect of Project-level Activities on Forest-wide Population Trends for MIS" below for additional analysis by alternative and on population trends

Table G-5: MIS, Estimated Population Trend, and Biological Community or Special Habitat Indicated by the Species

		Biological Community or Special Habitat					
Species	Estimated Population Trend	1	2	3	4	5	6
Black Bear	Increase	Old Forest Communities	Hard mast-producing species	Mixed Pine/hardwood forest types	Contiguous areas with low disturbance	Den trees (>36" dbh)	Downed woody debris- all sizes
Carolina northern Flying Squirrel	Static	Fraser Fir Forests	Red Spruce/fraser fir	Northern hardwood forests			
White Tailed Deer	Static to decreasing	Early-successional (0-10)	Hard mast-producing species	Mixed pine/hardwood forest types			
Raccoon	Increase	Alluvial Forests	Snags and dens (>22 dbh)				
Rabbit	Decrease	Early successional (0-10)	Permanent grass/forb openings				
Gray Squirrel	Static	Hard mast-producing species	Mixed pine/hardwood forest types	Small snags and dens			
Bobcat	Static	Early successional (0-10)					
Mink	Static	Alluvial Forests					
Bats	Varies by species	Caves	Old Forest Communities				
Pileated Woodpecker	Increase	Old Forest Communities	Snags and dens (>22 dbh)	Downed woody debris – all sizes			
Golden Crowned Kinglet	Decrease	Fraser Fir Forests	Red Spruce/Fraser Fir Forests	Carolina Hemlock bluff forests			
Veery	Static	Large Contiguous Forest Areas					
Solitary (Blue headed) Vireo	Increase	Red Spruce/Fraser fir	Northern Hardwood Forests	Cove Forests	Large Contiguous forests		

		Biological Community or Special Habitat					
Species	Estimated Population Trend	1	2	3	4	5	6
		Forests					
Northern Parula Warbler	Static	Large Contiguous Forest Areas					
Ovenbird	Decrease	Large Contiguous Forest Areas					
Yellow-Bellied Sapsucker	Decrease	Small snags and dens					
Rufous-Sided (Eastern) Towhee	Decrease	Early-successional (0-10)	Early successional (11-20)				
White-breasted Nuthatch	Increase	Small snags and dens					
Cedar Waxwing	Static	Soft mast-producing species					
Pine Warbler	Static	Yellow pine mid-successional forests					
Raven	Static	Open rock outcrops and cliffs					
Field Sparrow	Decrease	Early successional (0-10)					
Eastern Wild Turkey	Northern mtns = increase; Southern mtns = decrease	Hard mast-producing species	Mixed pine/hardwood forest types	Contiguous areas with moderate disturbance	Permanent grass/forb openings		
Ruffed Grouse	Static	Early successional (0-10)	Early successional (11-20)	Downed woody debris			

		Biological Community or Special Habitat					
Species	Estimated Population Trend	1	2	3	4	5	6
Peregrine Falcon	Increase	Open rock outcrops and cliffs					
Eastern Meadowlark	Absent	Permanent grass/forb openings					
Green Salamander	Static	Shaded rock outcrops and cliffs					
Jordan's Salamander	Static	Shaded rock outcrops and cliffs					
Spotted Salamander	Static	Mountain ponds and ephemeral pools					
Blue Ridge two-lined salamander	Static	Alluvial Forests					
Brook, Brown and Rainbow Trout, sculpin	Static	Coldwater streams					
Largemouth Bass, Bluegill	Static	Reservoirs					
Blacknose Dace	Static	Coldwater streams					
Freshwater mussels	Varies by species	Warmwater streams					
Smallmouth Bass, white/redhorses	Static	Coolwater streams	Warmwater streams				
Spotfin Chub	Static	Warmwater streams					
Red Oak	Static	Oak and oak/hickory forests					
White Oak	Static	Oak and					

		Biological Community or Special Habitat					
Species	Estimated Population Trend	1	2	3	4	5	6
		oak/hickory forests					
Buckeye	Static	Cove forests					
Basswood	Static	Cove forests					
Black Cherry	Increase	Cove Forests					
Hickory (All Species)	Static	Oak and oak/hickory forests					
White Pine	Increase	White Pine Forests					
Pitch and Table Mountain Pine	Decrease	Xeric yellow pine Forests					
Fraser Fir	Decrease	Fraser Fir Forests					
Carolina Hemlock	Increase	Carolina hemlock bluff forests					
Ginseng	Decrease	Cove Forests					
Mountain Oatgrass	Decrease	Grassy and heath glades					
Catawba Rhododendron	Increase	Grassy and heath glades					
Wild Grape	Decrease	Soft mast-producing species					
Twisted Stalk	Increase	Northern Hardwood Forests					
Turkey Beard	Decrease	Xeric yellow pine forests					
Mountain Lettuce	Static	Forested seep wetlands					
Umbrella Leaf	Static	Forested seep wetlands					

		Biological Community or Special Habitat					
Species	Estimated Population Trend	1	2	3	4	5	6
Golden Saxifrage	Static	Forested seep wetlands					
Slender Wheatgrass	Increase	Barrens and glades					
Prairie dropseed	Increase	Barrens and glades					
Alum root	Increase	Shaded rock outcrops and cliffs					
Saxifraga Spp.	Increase	Shaded rock outcrops and cliffs					
Wretched sedge	Decrease	Open rock outcrops and cliffs					
Biltmore sedge	Decrease	Open rock outcrops and cliffs					
Lobaria	Increase	Old Forest Communities					
Sphagnum	Static	Bogs					
Aquatic Invertebrates	Static	Coldwater streams	Coolwater streams	Warmwater streams	Reservoirs		

Evaluating the Effect of Project-level Activities on Forest-wide Population Trends for MIS

Oak Hickory Forest

Either action alternative selected (Alternative B or C), would temporary convert 315 acres of Oak Hickory Forest to an earlier succession stage of Oak Hickory Forest by harvest. Regardless of the selected action alternative, it would affect <0.05% of the 640,840 acres of Oak Hickory Forest within the Forests. The proposed action would have an very little impact on the Oak Hickory Forest in the Nantahala/Pisgah Forests because the proposed action is <0.1% of the total amount of Oak Hickory Forest within the Nantahala/Pisgah Forests and the proposed action does not convert communities. Red oak, white oak and hickory species were selected as MIS species for this community. The action is not expected to greatly influence the Forest-wide trends of Oak-Hickory Forests.

White Oak and Red Oak: The overall Forest trend in both of these species has been downward due to fire suppression and succession. However, local increase can occur within areas of silviculture treatments that favor oak regeneration. The proposal should positively favor oak regeneration on 315 acres because of harvest and post-harvest treatments (Greg Van Orsow). However, the cumulative positive impact on these treated acres would not be great enough (315 harvested acres of the 40,500 Forest acres, or 0.75%) to influence the AA or Forest-wide downward trend (see MIS report sections 4.44, 4.45 for detailed Forest habitat and trend discussion). The proposal is not expected to greatly influence Forest wide trends or population numbers of red oak, white oak, and hickory species. Locally (within harvest units) red oak, white oak, and hickory species are expected to have a temporary decrease of larger mature individuals and an increase in seedlings. This would become less apparent as succession continues.

Hickory: The overall Forest-wide trend in both oak and hickory has been downward in the last few decades but appears to be stable from pre-settlement data. This mid century increase is due to the increase in hickories after the loss of the chestnut and past logging practices (see MIS report section 4.49 for detailed Forest habitat and trend discussion). The proposed regeneration of 315 acres of Oak-Hickory will not have a great influence (positive or negative) of the local (Upper Creek) population of hickories because hickories would be favored as leave trees, where present (Greg Van Orsow). The proposed prescribed fire may decrease small individuals of hickories, but would not affect mature trees. The overall, net cumulative effect of the proposal upon hickory species is near zero and the current downward Forest-wide trend would remain static.

Xeric Yellow Pine Forest

About 92 acres or 3% of the Xeric Yellow Pine Forest within the project area would be affected by this action. The pine component, within these stands, was severely affected by the southern pine beetle. The Forest-wide trend in the Xeric Yellow Pine Forest is downward or negative because of fire suppression and maturing forests. It is expected that the action alternatives would positively influence a small portion of the local analysis area Xeric Yellow Pine Community but would not greatly influence the Forest trend of Xeric Yellow Pine Forest because of the very small portion of treated Forest acres.

Table Mountain Pine, Pitch Pine: The Forest-wide population trend of both Table Mountain Pine and Pitch Pine is downward due to the suppression of wildfire and less intensive logging within the last 75 years. The proposed logging of 92 acres of Xeric Yellow Pine Forest (Alternatives B or C) and controlled burn on 350 acres may improve the local trend by improving habitat conditions for both species. However, the cumulative positive impact on these treated areas may not be

great enough (92 treatment acres of the 28,400 Forest acres, or 0.3%) to influence the AA or Forest-wide downward trend (see MIS report sections 4.52, 4.53 for detailed Forest habitat and trend discussion).

Turkey Beard: The Forest-wide population trend of Turkey Beard probably is downward due to the suppression of wild fires and less intensive logging within the last 75 years. Turkey Beard is commonly found in open dry ridges of the xeric pine-oak heath community. It is associated with fire dependent plant communities. The proposed logging of 92 acres of Xeric Yellow Pine Forest (Alternatives B or C) and controlled fire on 350 acres may damage individual Turkey Beard but would improve the local trend by improving habitat. However, the cumulative positive impact on these treated areas may not be great enough (92 treatment acres of the 28,400 Forest acres, or 0.3%) to influence the AA or Forest-wide downward trend.

Early Successional Community

White-tailed deer, eastern wild turkey, ruffed grouse, rufous-sided towhee (eastern towhee), bobcat, field sparrow, and rabbit species were the wildlife species chosen by the Forest Plan as representative of this habitat. Ruffed grouse and the eastern towhee also represent the 11-20 age early successional community.

Eastern Towhee: Eastern towhee represents both early and mid successional stage of both 0-10 and 10-20 aged forest communities. There is currently 11% of the analysis area in this habitat age class. However, within two years 1% of this habitat would age beyond high potential habitat for the towhee. Alternatives B and C would increase early successional habitat by 1.7%, which would maintain the availability of towhee habitat to the next planning period. No activities are planned within current early successional habitat and the action alternatives would maintain the early successional habitat within the analysis area over the next planning period. These alternatives would maintain the current Eastern towhee populations across the Forests. The BBS trend shows the populations since 1966 have decreased. As early successional habitat has been reduced greatly across the Forests in the past 10 years, this downward population trend is to be expected.

Field Sparrow: Field sparrow represents the brushy, riparian thicket portion of early successional communities in 0-10 year age range. Riparian areas would be protected from harvesting throughout implementation of any alternative selected. Several stands near riparian areas that would create high potential habitat for this species are proposed to be regenerated; stands 94-1, 94-2, and 93-2, and the lower portion of stands 95-36, 95-37, and 90-5. Alternatives B and C would improve habitat availability on 63 acres for the sparrow. This species is ground nesting and there would be adverse effects to nesting success where equipment entered early successional habitat. No activities are planned within existing early successional habitat, so there would be no adverse effects to this species by the activities proposed. The proposal would increase habitat and thus would benefit the sparrow. The BBS trend shows the population since 1966 to have decreased considerably. The need to increase the early successional habitat across the SAA is paramount to maintaining this species across the Forests. Alternative A would not create any habitat for the species and in two years the early successional habitat would age beyond this species preferred habitat, contributing to the downward trend of the population across the area.

Ruffed Grouse: Ruffed grouse is representative of both 0-10 and 11-20 year age class habitat. Ruffed Grouse survey routes along FSRs 198 and 4099 have shown a very small population of grouse for the past four years.

Ruffed grouse require both mature forests with a conifer understory and dense, early successional habitat. Seeps and riparian areas provide much of the herbaceous food during spring, however the limiting component for this species is early successional and brood (grass/forb) habitat. Grass/forb habitat provides habitat for a diverse insect component necessary for the high protein required for brood survival. The dense habitat found in early successional habitat provides both protection from prey, and soft mast, buds, and invertebrate food throughout the year for the grouse. Mature stands are used during drumming season by the adult birds and the conifer understory provides both soft and hard mast food and thermal cover during winter months. Recommendations include retention of hemlock understory and soft mast producing species. The ruffed grouse population across the Forests is low, due in large part to the lack of early successional habitat on NFS lands, which generally tend to be developed into residential use on private lands. The early successional habitat tends to be sporadic and not well connected or distributed across the landscape. Nesting success was considered as a possible reason for the lower densities of grouse within the southern portion of its range by Dobony et al (2001). The findings determined that nest success rate was lower due to two common predators: raccoons and black rat snakes, *Elaphe o. obsolete*, and re-nests were considerably lower within the southern range of the ruffed grouse. The 2003 Monitoring & Evaluation (M&E) report for the National Forests of North Carolina reported that ruffed grouse populations were down from 2002, but overall the population is static on Forests.

Alternatives B and C both increase early successional habitat by 1.7% at both higher and lower elevations within these analysis areas. The total amount of early successional habitat would remain below Forest Plan guidelines and suitability for the grouse. Alternative A would have an adverse effect on this species due to the decreasing early successional habitat as the communities' age. The proposed harvest would not decrease the large patches of older forest as they are concentrated and connect the current early successional habitat. Alternatives B and C would maintain current ruffed grouse populations within the AAs, but would not be great enough to change the existing Forests population trend.

Rabbits & Bobcats: Rabbits and bobcat were both selected by the Forest Plan as MIS of early successional habitat. They represent both the predator and prey common within this habitat. Bobcats are generally most abundant in early to mid-successional habitats (N&P MIS report 2002). The MIS (2002) report defined bobcat populations based on their prey habitat and the majority of the bobcats prey within the southeast has been found to be rabbits/cottontail. The bobcat is territorial, so it is not often found in large numbers on a particular area and the MIS (2002) report stated that although bobcat would remain across the Forests, their numbers would decline and home range size increase due to the limited amount of early successional habitat. This proposed project would not change the bobcat population trend across the Forests. Rabbit species in general utilize woody stems within early successional habitat during the winter months and utilize the more open environment of grass and forb habitat for feeding at night during the summer. Alternative C would increase both the grass/forb and early successional habitat the most which may increase the local populations. Harvest of both species through trapping and hunting has been on a downward trend for the past 30 years and this trend is expected to continue (NCWRC, MIS 2002). Any of the alternatives as proposed would not change the decreasing rabbit population trend across the Forests.

Eastern Wild Turkey: The Eastern wild turkey utilizes early successional habitat for critical brood rearing as the invertebrates across these areas are more readily available to broods. The increase in soft mast also contributes to the food source of both broods and adult during the summer and early fall. The increase in grass/forb habitat under Alternative C would provide necessary brood

habitat for local populations. The smaller amount of additional grass/forb under Alternative B is not expected to be great enough to alter the local population. This species' population is increasing across the Forests (M&E 2003) and the increased early successional habitat, grass/forb, and soft mast under either action alternative would ensure the Forests and local population trends persist.

White-tailed Deer: The white-tailed deer population on the Forests is static and has declined since 2002 (M&E 2003). Regenerating forests provides forage for the deer as well as escape cover. The small amount of acres proposed by the action alternatives to provide early successional habitat may increase local populations but is too limited to affect the current population trend across the Forests.

Soft Mast Producing Community

Cedar Waxwing and Wild Grape: The cedar waxwing and wild grape are selected in the Forest Plan as the MIS representative of this community. The waxwing population has been shown by the BBS population trend data to be increasing across North Carolina. This species was not recorded during surveys within the project area; therefore, although this project proposal would increase the soft mast habitat in regeneration areas and maintain soft mast throughout post-harvest treatments, it would not affect the waxwing's populations or change the Forest population trend. Holly, black gum, and dogwood soft mast species would be retained during post-harvest treatments; therefore ensuring soft mast is maintained at adequate levels across the AAs. Three wild grape (*Vitus* species) were found within the AAs. *Vitus asestivalis* is by far the most common species. Both action alternatives would generate a potential of 385 acres of regeneration or soft mast habitat. However, grape species would be targeted during post-harvest timber stand treatment, resulting in very little net increase in habitat for grape species within regeneration units. Therefore, all alternatives would result in little increase in grape species habitat. Any alternative selected would not greatly influence the Forest-wide downward trend for grape species.

Hard Mast Producing Community (40+ years of age)

Black bear, eastern wild turkey, gray squirrel, and white-tailed deer were selected by the Forest Plan as representative of this community type. Hard mast production declines at an average of 100 years, and these high quality forest type stands range from 41–100 years of age. These wildlife species were also chosen to represent the low quality hard mast forest type of the pine/hardwood community, and high quality forest types over 100 years of age. The total current acreage of high quality hard mast is 8,999 across the AAs and the current acreage of low quality hard mast is 4,829 acres. Alternatives B and C would reduce the high quality hard mast community by 121 acres or 1.3%. These alternatives would also reduce the low quality hard mast community by 82 acres or 1.7%. Residual tree species marking priority would ensure that hard mast production would continue on all the regeneration activities in Alternative B and Alternative C hard mast production would be at a lower volume on stand 107-2, approximately 40 acres. Hickory, white oak, and red oak are the priority species to leave, where they occur within two-aged harvest areas. The Forests' MIS report found that all hard mast tree species, with the exception of the shade tolerant red oak, are decreasing across the Forests. Stands ≥100 years, and the regenerated forests are dominated by shade tolerant tree species. Timber stand improvement (TSI) activities proposed are expected to maintain or increase the hard mast component within the project area. This habitat trend led to the conclusion that gray squirrel habitat and populations were experiencing a downward trend across the Forests (MIS 2002). This proposed project is not sufficient in size or potential hard mast loss to adversely affect the current downward gray squirrel population trend across the Forests. The black bear and wild

turkey are both experiencing an increasing population trend on the Forests (M&E 2003). White-tailed deer are experiencing a static to downward trend in population (M&E 2003). The proposed project activities would both increase and decrease potential habitat for this species. The proposed activities are not of sufficient size to greatly influence the available habitat across the AAs, nor the local populations or the population viability trends across the Forests.

Black bears require large areas free from disturbance by motorized vehicles, frequent human activity, and intensive timber harvesting and were selected in the Forest Plan as representative of old forests and hard mast producing communities, downed woody debris, and large diameter dens within vegetative communities. Bears in much of the eastern United States depend on hard mast for the energy needed for reproduction and hibernation. A bears' home range will increase as the amount of area in regeneration increases, resulting in greater potential rates of mortality where open road density is high. However, research studies carried out by Dr. Van Manen found many female bears to utilize brush/slash piles within clearcuts for denning, even when suitable den trees were adjoining the regeneration areas.

Across the Forest, black bear populations have increased due to many factors, habitat management, state black bear sanctuary system, and reduced hunting. As young bears migrate from protected sanctuary areas, they increasing occupy habitats with reduced hunting pressure, allowing the population to increase further. Mountain population models, based on age structure and reproductive information collected by NCWRC personnel, indicate that populations have grown considerably over the last decade. Models are most accurate at predicting populations up to 2-3 years prior to the last year for which we have age and reproductive data. Therefore, one can be confident in a population increase experienced from 1980-1996. These models indicate the system of regulations, enforcement, and sanctuaries in place in the region should be effective in protecting females and in maintaining a viable mountain population despite hunting harvests. The 2003 M&E report for the Forests stated the black bear population is increasing across the Forests. The proposed activities are not of sufficient size to influence area populations or the population viability trends across the Forests.

Permanent Grass/forb Community

Eastern wild turkey, eastern meadowlark, and rabbit species were selected to represent this community in the Forest Plan. Alternative B would not increase the current grass/forb community sufficiently to affect any local populations. Alternative C would increase available grass/forb the most, especially at higher elevations, for both the local populations of wild turkey and rabbits to a limited extent. Eastern meadowlark was not recorded during bird surveys and has not been recorded on the Forest during any of the R8 bird point surveys done the past four years. The BBS population trend demonstrates the meadowlark is on a sharp downward trend of 3.96. Alternative C would benefit the local wild turkey brood and rabbit populations but is not sufficient to increase the potential of any local meadowlark population. The Forest Plan recommends 5% grass/forb. Together with the current grass/forb, Alternative C would produce approximately 11½ acres and increase the habitat over the analysis area to 0.7% grass/forb, but still well below plan recommendations.

Contiguous Areas of Moderate Disturbance Level

If the Brown Mountain ORV area is excluded from the road analysis, these AAs meet the definition of a moderate disturbance level community. The Brown Mountain ORV area is concentrated on the southern portion of the AAs, with remaining large areas of low disturbance. Many of the miles considered for this analysis are State roads or highways and private roads. The eastern wild turkey is the wildlife species that represents this community. The wild turkey

population is increasing across the Forests and described within the hard mast community assessment. All alternatives considered would not change the disturbance level community; the regeneration proposed is clustered and no new open roads would be constructed. The 0.25 miles of temporary road proposed in the action alternatives would be closed post-harvest and would not contribute to the disturbance level within the area.

Small Size Snag and Den Community

White-breasted nuthatch, gray squirrel (see hard mast producing community above), and yellow bellied sapsucker represent the small snags/den communities. The BBS population trend from 1966 to 2003 demonstrates a large increase of 3.7 in nuthatch populations. This species depends on small cavities for nesting and is most commonly found in open, mature hardwood forests. This forest type is found throughout the AAs but is not in a particularly open condition—thinning would benefit this species the most. Timber stand improvement activities before and after any harvest activities would increase the amount of small snags for cavity building and insect or larvae foraging. Nuthatch was recorded in stands 87-22, 95-1, and 95-2. Alternatives B and C would not greatly increase or decrease effects on this species due to the large amount of habitat found across the analysis area that would not be affected. Therefore, any alternative considered would not affect the population trend across the Forests. This species winters within Western North Carolina where it feeds on seeds and nuts. The project has been designed to retain soft mast species, benefit nuthatch wintering habitat. The yellow bellied sapsucker was not recorded in any bird surveys including Dr. Curtis Smalling, Audubon biologist surveys of Upper Wilson Creek drainage. Therefore, any alternative considered would not affect the population trend across the Forests.

Downed Woody Debris (all sizes)

Black bear (see hard mast producing community above), pileated woodpecker, ruffed grouse (see early successional community above), and Jordan's salamander were all chosen as wildlife representing this forest community. Black bear and pileated woodpecker utilize this community for food, grubs, and larvae; whereas the grouse utilizes large diameter debris and stumps for drumming, and the Jordan's salamander utilizes the woody debris as cover. There would be an increase in both small and large woody debris by harvesting activity that would be suitable for bear and woodpecker foraging and grouse drumming activities. However, the exposure of sunlight to both woody debris and soil in the harvest area would dry them and raise temperatures of the upper forest soil layers. This would result in less Jordan's salamander habitat for approximately 20 years. Surveys in the areas proposed for harvest found the soils to be poor habitat for salamanders with the exception of the eastern portion of stand 94-02. Although no Jordan's salamanders were found, the displacement or reduction in salamander habitat may increase mortality of other salamander species within this area. The small amount of habitat that would be altered would not affect population viability trends of the Jordan's salamander across the Forests. The pileated woodpecker also represents this community in the Forest Plan. Forest Plan standards require two snags or den trees, 15 inches in diameter and greater be retained, where they exist, during harvest activities for every ten acres regenerated. This standard would ensure nesting sites remain across the AAs. As only 1.7 % of the AAs are proposed for regeneration by Alternatives B or C, the pileated woodpecker population is cited in the BBS population trend as increasing, and this species is commonly seen in all community types. No alternative would change population viability trends across the Forests.

Yellow Pine Mid-successional Community

The Forest Plan selected the pine warbler to represent this community type with a 7-10 year fire history regime. The proposed fuel reduction burn in Alternative B and C is within yellow pine;

high potential pine warbler habitat. This species builds its nest within pine trees at medium height. The flame heights in the proposed burn would not affect any nests within live trees. The Xeric yellow pine community is concentrated on the southern portion of these AAs, generally on ridge lines is also pine warbler habitat. This community was hit hard by the southern pine beetle epidemic and the proposed burn would increase the amount and vigor of yellow pine regeneration. Regeneration harvest is proposed by alternative B and C in Xeric yellow pine community. If harvest is during nesting season, individuals may be negatively affected; however adults may re-build within the pine habitat surrounding the harvest area. The BBS population trend demonstrates no appreciable change in pine warbler populations over the period of 1966-2003. Either action alternative may directly affect impact individuals with the proposed regeneration harvest. The proposed burn will improve warbler habitat, therefore there will be beneficial indirect affects with either action alternative. Alternative A would not improve habitat conditions for the warbler by prescribe burning. The cumulative affects of Alternative B or C to local populations of both negative direct and positive indirect affects would result in no affect the pine warbler population across the Forests. Alternative A would not affect direct affect local populations or indirectly improve habitat, therefore there would be no change to the current population trend across the Forests.

Invasive Exotic Plant Species

Potential habitat for exotic invasive species can increase with an increase in disturbance. While disturbance from tree removal and creation of wildlife fields can offer some increased habitat for exotic invasive plants, new road is the prime habitat for many exotic invasive plants it is less clear that temporary road construction is habitat for exotic invasive plants. Therefore, a good measure of habitat for comparison potential changes of exotic invasive plants is the creation of miles of **new** roads (Nantahala/ Pisgah Forests MIS Report, section 4.58).

Forest-wide, 2,684 miles of road construction has occurred within the Pisgah/Nantahala National Forest within the last 25 years or 107.3 miles per year. Alternative B and C would contribute 0.25 miles of **temporary** road construction or increase exotic plant species habitat by <1% of the yearly average. On the other hand, Alternative A would contribute no new road construction or increase exotic plant species habitat. All action alternatives would not greatly contribute to an undesirable the Forest-wide trend in exotic plant species habitat. Alternative A would not increase exotic plant species habitat (see discussion in selection concerning individual invasive exotic plant species in botanical report, project record).

Japanese Honeysuckle & Japanese Grass: Japanese Honeysuckle & Japanese Grass were selected as an MIS species to represent exotic invasive species habitat. The Forest trend for these species is positive. Both species occur in disturbed habitats. Japanese Honeysuckle & Japanese Grass is well established in roadsides, wildlife fields and bottomland areas near large streams such as Upper Creek and Timbered branch within the project area. The action alternatives will only slightly increase the populations of either of these species because their populations are so well established within the watershed and the amount of permanent open habitat needed for the establishment of these species is small (0.25 temporary road). This would not cumulatively influence the local (Upper Creek) or Forest trend.

Chinese Privet & Periwinkle: Chinese Privet & Periwinkle were selected as an MIS species to represent exotic invasive species habitat. The Forest trend for these species is positive. Both species occur in disturbed habitats. Neither of these species is known to occur within the Analysis area. Therefore, there are no known effects (positive or negative) to these species.